Verilink M1-3
User Manual

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VERILINK®

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FCC Requirements

This equipment has been tested and found to comply within the limits for a Class A digital device pursuant to Part 15 of the Federal Communications Commission (FCC) rules. These limits are designed to provide protection against harmful interference in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the user manual, can cause harmful interference to radio communications.

There is no guarantee that interference will not occur in a particular installation. If this equipment causes harmful interference to radio or television reception—which can be determined by turning the equipment off and on—try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This equipment complies with Part 68 of the FCC Rules. On the rear, side or bottom of the unit is a label that contains the FCC registration number and other information. If requested, provide this information to the telephone company.

- All direct connections to the network lines must be made using standard plugs and jacks (compliant with Part 68). The following tables list the applicable registration jack universal order codes (USOCs), facility interface codes (FICs), and service order codes (SOCs). These are required to order service from the telco.

For T1 interfaces:

Port ID	REN / SOC	FIC	USOC
1.544 Mbit/s SF 1.544 Mbit/s SF, B8ZS 1.544 Mbit/s ANSI ESF 1.544 Mbit/s ANSI ESF, B8ZS	6.0N	04DU9 -BN 04DU9 -DN 04DU9 -1KN 04DU9 -1SN	RJ-48C jack

For DDS interfaces:

Port ID	REN / SOC	FIC	USOC
56 kbit/s 64 kbit/s	6.0N	04DU5 -56 04DU5 - 64	RJ-48S jack

- If the unit appears to be malfunctioning, inform the telco and disconnect it from the network lines until the source of trouble is determined to be your equipment or the telephone line . If your equipment needs repair, it should not be reconnected until it is repaired.
- The unit has been designed to prevent harm to the network. If the telephone company finds that the equipment is exceeding tolerable parameters, it can temporarily disconnect service. In this case, the telephone company will provide you advance notice if possible.

- If the telephone company alters its equipment in a manner that can affect the use of this device, it must give you warning so that you have the opportunity to maintain uninterrupted service. You will be advised of your right to file a complaint with the FCC.
- No customer is authorized to repair this equipment, regardless of warranty status. All repairs must be performed by Verilink or an authorized agent. It is the responsibility of users requiring service to report the need for service to Verilink or to one of our authorized agents.

Lithium Battery

The lithium battery referred to in the following notices is contained inside the clock chip.

English

DANGER!

The battery can explode if incorrectly replaced! Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

DANGER!

To avoid electrical shock in case of failure, the power supply must be installed by a professional installer. The terminal labeled with the ground symbol (⏚) on the power supply must be connected to a permanent earth ground.

CAUTION!

Interconnecting circuits must comply with the requirements of EN60950:1992/A4:1997 Section 6.2 for telecommunications network voltages (TNV) circuits.

Français

ATTENTION!

Une explosion peut se produire si la batterie est remplacée d' une façon incorrecte! Remplacez-la seulement avec le même modêle de batterie ou un modèle équivalent selon les recommendations de manufacture. Disposez de les batteries usées selon les instructions de manufacture.

ATTENTION!

Pour éviter choc électrique en cas de insuccès, la provision de pouvoir doit êtré installé par un installeur professionnel. Le terminal de la provision de pouvoir, marqué du symbol de terre, (⏚) doit connecté à un circuit de terre permanent.

PRUDENT!

Les circuits doivent êtré interconnectés de manière à ce que l' équipement continue a êtré en agrément avec "EN60950:1992/A4:1997, Section 6.2, pour les circuits de voltage de liaisons d' échanges (réseau) par les télécommunications (TNV)," après les connections de circuits.

Español

ATTENCION!

La bateria puede explotar si se reemplaza incorrectamente. Reemplace la bateria con el mismo tipo de bateria ó una equivalente recomendada por el manufacturero. Disponga de las baterias de acuerdo con las instrucciones del manufacturero.

ATTENCION!

Para evitar contacto con circuitos que electrocutan, la fuente de alimentación debe ser instalada por un técnico profesional. La terminal de la fuente de alimentación marcada con el símbolo de tierra (⏚) debe ser conectada a un circuito de vuelta por tierra permanente.

PELIGRO!

Circuitos que se interconectan a la red de telecomunicaciones deben hacerse de tal manera que cumplan con los requisitos estipulados en las especificaciones "EN60950:1992/A4:1997, Sección 6.2, para los voltages de circuitos interconnectados a la Red de Telecomunicaciones (TNV)," despues de terminar las connecciones entre los circuitos.

Deutsch

VORSICHT!

Explosionsgefahr bei unsachgemäßem Ersetzen der Batterie! Batterie gleichen Typs und gleicher Qualität benutzen, wie vom Hersteller empfohlen. Entsorgung der Batterie nach Anweisung des Herstellers!

VORSICHT, GEFAHR!

Um keinen Schlag zu erhalten beim Versagen der electrischen Anlage, muss der Stromanschluss von einem Elektriker vorgenommen werden. Der elektrische Pol, versehen mit dem Erdsymbol (⏚) muss am Stromanschluss permanent geerdet sein.

VORSICHT!

Schaltungen, die in den Geräten zusammengeschaltet sind, müssen weiterhin den Vorschriften EN60950:1992/A4:1997, Absatz 6.2 für Telecommunications Netz Spannung (TNV) Schaltkreize entsprechen.

Canadian Requirements

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques (de la class A) prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

The Industry Canada label indentifies CS-03 certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational and safety requirements. Industry Canada does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

Caution: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

Safety Precautions

This equipment is intended to be installed only in a Restricted Access Location that meets the following criteria:

- Access can only be gained by service personnel or users who have been instructed about the reasons for the restrictions applied to the location and about any precautions that must be taken.
- Access can only be gained through the use of a lock and key or other means of security, and is controlled by the authority responsible for the location.

When handling this equipment, follow these basic safety precautions to reduce the risk of electric shock and injury:

- Follow all warnings and instructions marked on the product and in the manual.
- Unplug the hardware from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a cloth slightly dampened with water.
- Do not place this product on an unstable cart, stand, or table. It may fall, causing serious damage to the product.
- Slots and openings in the shelves are provided for ventilation to protect them from overheating. These openings must not be blocked or covered. Never place this product near a radiator or heat register.

- This product should be operated only from the type of power source indicated on the marking label and manual. If you are unsure of the type of power supply you are using, consult your dealer or local power company.
- Do not allow anything to rest on the power cord. Do not locate this product where the cord will interfere with the free movement of people.
- Do not overload wall outlets and extension cords, as this can result in fire or electric shock.
- Never push objects of any kind into the shelves. They may touch dangerous voltage points or short out parts that could result in fire or electric shock. Never spill liquid of any kind on this equipment.
- Unplug the equipment from the wall outlet and refer servicing to qualified service personnel under the following conditions:
    - When the power supply cord or plug is damaged or frayed.
    - If liquid has been spilled into the product.
    - If the product has been exposed to rain or water.
    - If the product has been dropped or if the cabinet has been damaged.

Product Warranty

Verilink's product warranty covers repair or replacement of all equipment under normal use for a five-year period from date of shipment. Replacement products may be new or reconditioned. Any replaced or repaired product or part has a ninety (90) day warranty or the remainder of the initial warranty period, whichever is longer. Our in-house Repair Center services returns within ten working days.

Customer Service

Verilink offers the following services:

- System Engineers at regional sales offices for network design and planning assistance (800) 837-4546
- Technical Assistance Center for free 24x7 telephone support during installation, maintenance, and troubleshooting (800) 285-2755 and support@verilink.com
- To return a product, it must be assigned a Return Materials Authorization (RMA) number before sending it to Verilink for repair (800) 926-0085, ext. 2282
- Maintenance contracts and leasing plans (800) 837-4546
- Technical Training on network concepts and Verilink products (800) 282-2755 and training@verilink.com
- Web site (www.verilink.com)

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Chapter 1

M1-3 Overview

The Verilink M1-3 Time Division Multiplexer is designed to aggregate 28 DS1 signals into a DS3 signal. This application module operates with Verilink's AS3000 product line.

The M1-3 application consists of the following components:

- M1-3 application module
- CIM 3113 Rear Connector Module

The M1-3 module is designed to operate with any of Verilink's AS3000 application modules. M1-3 control is provided by the SCM controller module.

The M1-3 module manages and combines up to 28 T1 datastreams (digitized voice, data, and video applications) into a T3 or fractional T3 datastream. The DS3 port supports C-bit parity and M1-3 M-frame structure for multiplexing DS1 to DS3.

NOTE: *The IMUX and QUAD DATA application modules referred to in this manual are due to release in Q3 1999.*

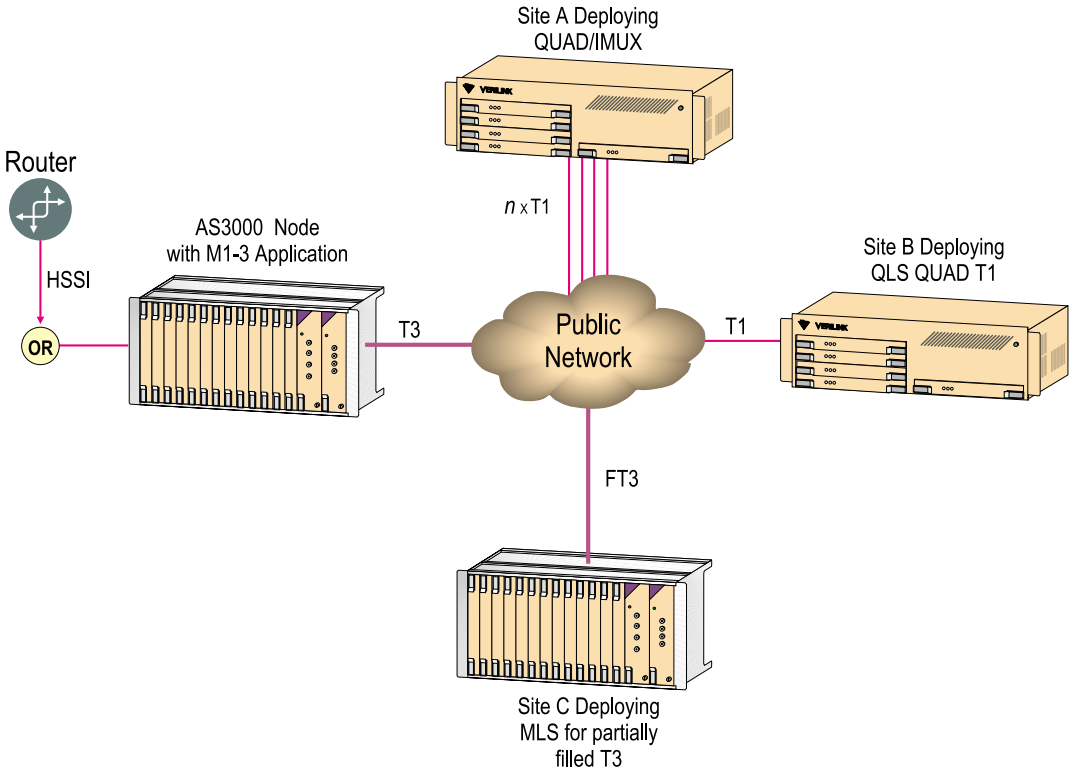
Applications

The Verilink M1-3 Multiplexer is used to multiplex multiple T1s from PBXs, routers, digital voice, and video applications into a T3 or fractional T3 service carrier. The far-end equipment can be one of the following:

- Inverse multiplexers for high speed access and frame relay networking (QUAD/IMUX).
- Another M1-3 with a full or fractional DS3 interface.
- Single T1/FT1 QUAD T1.

The M1-3 provides 28 synchronous DS1 payloads to/from the AS3000 system midplane, providing a single DS3 network interface supporting a line rate of up to 44.736 Mbit/s (Figure 1-1).

Figure 1-1 M1-3 Application



Features

The M1-3 provides performance monitoring and statistic gathering at the DS3 network port. Node control and M1-3 management is provided by Verilink's SCM.

M1-3 Compliancy Standards

The M1-3 complies with the following ITU-T, ANSI, ISO, and Bellcore standards and requirements:

- ANSI T1.107.1988 (M1-3 Section)
- ANSI T1.107a.1990 (M1-3 Section)
- AT&T Publication 54014
- AT&T Publication 54024
- FCC Part 15
- ISO 9000

Network Management

Network management for the M1-3 is supported through the SCM using SNMP, Verilink's Node Manager software, or the Craft (ASCII) interface. The SCM supports the following MIBs for the M1-3 multiplexer application:

- Verilink Enterprise M1-3 MIB
- RFC 1406
- RFC 1407

The M1-3 front panel supports a Craft interface; however, M1-3 configuration and control is performed using the SCM. The M1-3 is not a standalone application and must be used with the SCM. The SCM manages the nodes system parameters and circuits between the M1-3 and other application modules.

LED Color Codes

The M1-3 front panel LEDs use the following color codes:

Solid Green	Element is properly configured and equipment is operating normally.
Solid Red	Indicates a problem or some non-operational condition occurring within the equipment.
Solid Amber	Indicates test mode condition within the equipment.

Detailed information about LEDs can be found in Chapter 4 "*Performance Monitoring*".

Timing Options

The M1-3 module supports three modes of timing sources:

- **Internal**—Reference timing is derived from the free-running internal oscillator.
- **Network**—Reference timing is derived from the incoming DS3 datastream.
- **External**—Reference timing is derived from the external clock (supports line rate of up to 44.736 Mb/sec) that is connected to the BNC connector labelled EXT TIMING INPUT on the M1-3 rear connector module.

When working with other modules, set the M1-3 to use the shelf timing table, since the M1-3 always operates with another module.

Inband Management Channel

The M1-3 module provides support for inband channel management in C-bit parity applications. The M1-3 transmits three messages per second, and uses the standard inband management protocol.

Far-End Alarm and Control

The M1-3 module supports Far End Alarm and Control (FEAC) signals in C-bit parity applications. The third C-bit in the DS3 M-subframe 1 provides the FEAC signal. Bit-oriented message protocol (16-bit length) is used on the FEAC datastream.

Firmware Upgrades

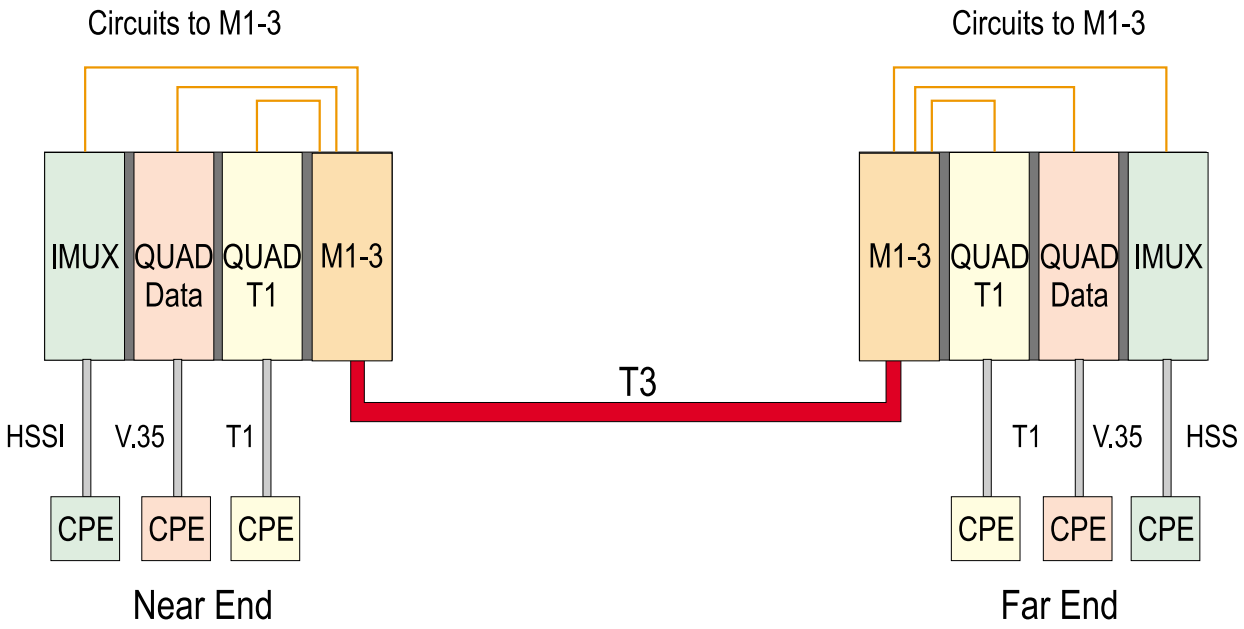
The M1-3 communicates with other AS3000 modules using Verilink's Advanced Programmable Architecture (APA). APA supports M1-3 flash firmware upgrades through FTP downloads. The flash firmware can also be field-replaced with upgraded chips.

Technical Description

The M1-3 application module is specifically designed for the AS3000 platform. It can operate in conjunction with other Verilink AS3000 modules to support a variety of applications.

Figure 1-2 shows the versatility of the M1-3 when combined with other Verilink modules in the AS3000 system.

Figure 1-2 M1-3 Versatility



M1-3 Components

The M1-3 shown in Figure 1-3 and Figure 1-4 consists of the following components:

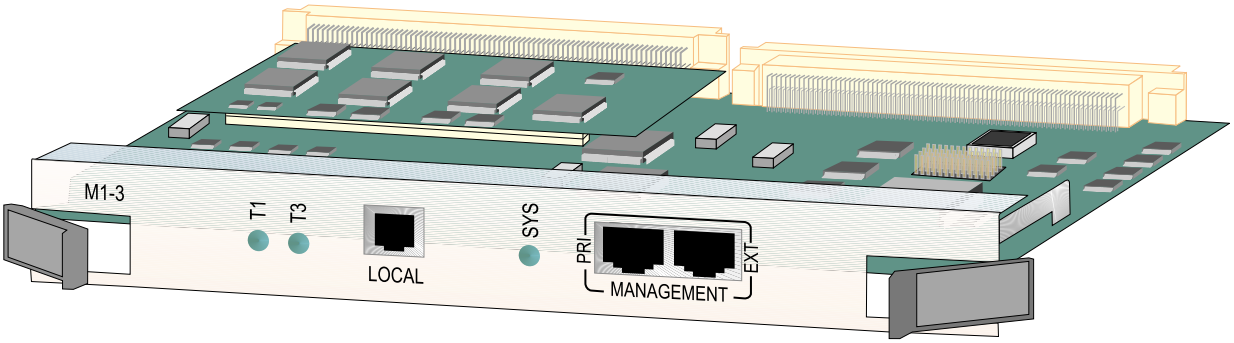
M1-3 Application Module

The front-panel application module contains the multiplexer microprocessor including flash firmware. The front module supports the following management ports:

- Craft (LOCAL) port for fault isolation and test.
- Primary and extension management ports for transferring ACP messages between shelves or Node Manager.

The front panel also supports three status LEDs labeled SYS, T1, and T3.

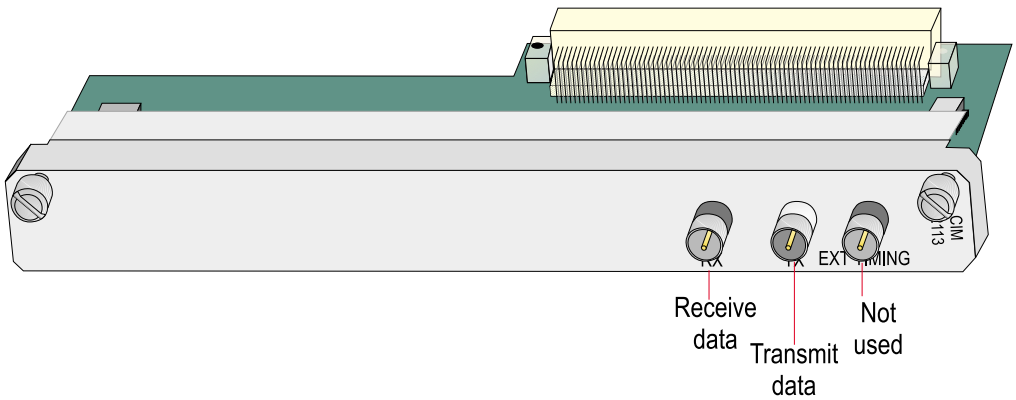
Figure 1-3 M1-3 Front Panel



CIM 3113 Rear Connector Module

A detachable rear connector interface module (CIM) connects to the M1-3 module. The CIM provides three interface connectors (Figure 1-4) including two coaxial DS3 ports (TX and RX), and a coaxial external timing port. The RJ-11 diagnostics port and two mini D-sub connectors are not used.

Figure 1-4 M1-3 Connector Interface Module



Installation

The Verilink M1-3 application module is installed after the rear connector module. For detailed installation procedures, refer to Chapter 3 of the *AS3000: The Basics* manual.

WARNING

Do not install the M1-3 with non-AS3000 equipment. Improper installation can cause equipment damage.

M1-3 Specifications

The following specifications apply to the M1-3 application module in the AS3000 environment.

Table 1-1 Network Specifications

Network Interface	
Type	DS3
Line Rate	44.736 Mbit/s ± 20 ppm
Framing	C-bit parity, M13
Line Code	B8ZS
Input Signal	-11.7 dbm to +6.2 dbm, level DS3
Output Signal	-4.7 dbm to +3.6 dbm (DSX-3 cross-connect point)
Impedance	75Ω ± 5%
Connector	BNC female, one each for TX and RX
Internal T1 Rate	$n \times 1.544$ Mbit/s, where n = 1 to 28
System Timing	External T3 (BNC), Network, or Internal

Regulatory Requirements

This product complies with the following regulatory specifications as they apply to telecommunications equipment:

- FCC—Part 15, Subpart J, Class A: Computing devices
- 15.810: Radiated Emission
- 15.812: Conducted Emission
- UL 1459, 2nd Edition
- CSA—C225

Agency Approvals

This product is certified and verified to comply with regulatory requirements of the following agencies:

- FCC
- UL
- CSA

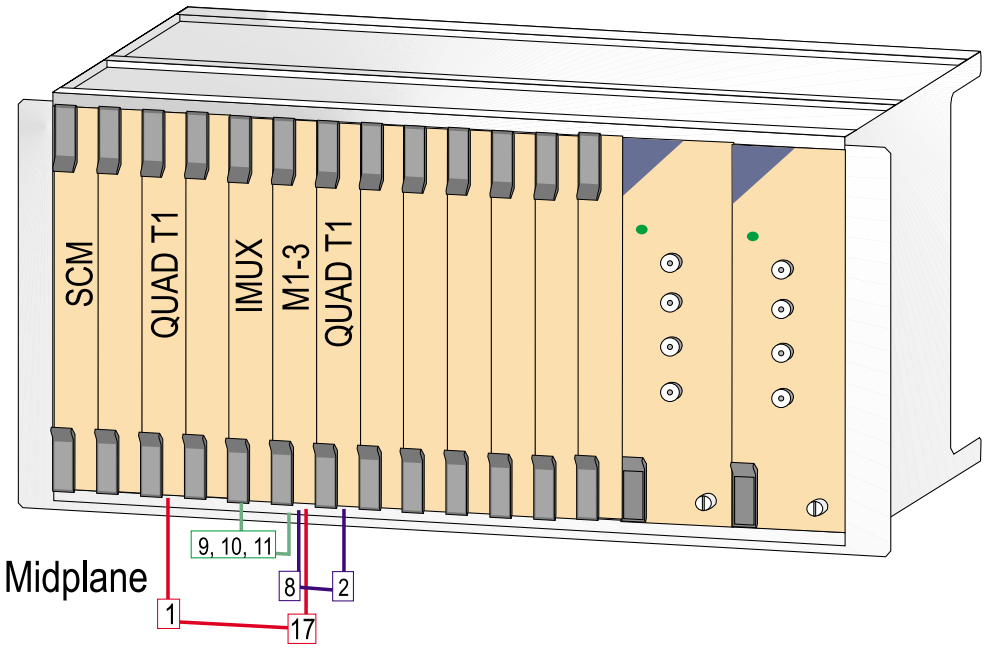
Chapter 2 Quick Set-Up

The Quick Set-Up section provides the steps necessary to install and configure an M1-3 module. Refer to the menu options described in Chapter 3, "M1-3 Configuration Options" when determining the settings and values for your configuration.

This chapter also provides an example configuration and makes the following assumptions:

- That an SCM is in slot 1 with a shelf address of 1. An M1-3 multiplexer is in slot 6, a QUAD T1 is installed in slot 3, and an IMUX module is in slot 5 (Figure 2-1).

Figure 2-1 Configuration Example Module Placement



The following circuits are developed in the circuit build example shown in Figure 2-7.

- The M1-3 T1 number 17 to the QUAD T1, net1.
- The M1-3, T1 number 9, 10, and 11 to the IMUX module.

NOTE: *Adjust one or more of these values to adapt the quick set-up to your configuration.*

Installation

Mount the shelf within an air-conditioned room on a standard 19 or 23” rack. Refer to the *AS3000: The Basics* manual for detailed module installation instructions and precautions.

CAUTION

Verilink components contain static-sensitive circuits. Before unpacking the equipment, ensure you are wearing an anti-static wrist strap connected to frame ground to prevent damage to circuits from electrostatic discharge.

Module Installation

Install the M1-3 module components as follows:

1. Install the rear connector module, CIM 3113 into the back of the MLS shelf, slot 6.
2. Install the M1-3 module into the front of the shelf in slot 6.
3. Connect the T3 cables to the ports on the CIM 3113.

The M1-3 module verifies self test (LEDs flash red, then green, in rapid succession).

Log In

Connect a Craft cable to the port labelled LOCAL on the front of the SCM module. Connect the other end of the Craft cable to your PC or terminal. If using a PC, start a session in a terminal program.

1. Set your terminal parameters to:
   - 19.2 kbit/s
   - 8 data bits
   - No parity
   - One stop bit
   - No flow control
2. Press ENTER and the **pSH+>** prompt displays.
3. Type “craft” (lowercase).
   The prompt **Your Password** displays.
4. Initially there is no password, press ENTER.
   The **SCM Main Menu** displays.

Figure 2-2 M1-3 Configuration Menu

```
-- VERILINK SCM CONTROLLER : FW Rev 1.17, Aug 12 1998 08:33:28   --

   Site name:  SCM Tutorial                  Access level:  4
   Managing at NEAR end node [0.0.0.2]            Node id:  122

                          <- SLOT ->
 SHELF   1   2   3   4   5   6   7   8   9   10  11  12  13
   0     -   -   -   -   -   -   -   -   -   -   -   -   -
   1 M [*S]  -   Q   -   I   M   -   -   -   -   -   -   -
   2     -   -   -   -   -   -   -   -   -   -   -   -   -
   3     -   -   -   -   -   -   -   -   -   -   -   -   -
   4     -   -   -   -   -   -   -   -   -   -   -   -   -
KEY: D=QUAD D, I=IMUX, M=M1-3, Q=QUAD T1, S=SCM

S) shelf/slot                O) administration
C) configuration             D) diagnostics
P) performance/status        A) alarm
B) circuit manager           I) manufacturing info
X) logoff
```

NOTE: *For the rest of this chapter, you are not instructed to press* ENTER *after each command. Generally,* ENTER *is used after each keyboard entry.*

Configuring the M1-3

This section shows how to configure the M1-3 module to the sample application from its default values.

NOTE: *This chapter assumes the SCM parameters are already set (i.e. the time, date, etc.).*

To configure the M1-3 module from the **SCM Main Menu**:

1. Select **S** from the **SCM Main Menu**.
2. Type the shelf and slot number of the M1-3 (1,6).

When the M1-3 is selected, the brackets have moved to the **[M]** in slot 6.

Configuration Menu

The **M1-3 Configuration Menu** is used to enable each of the ports and configure parameters such as interface type and data port mode. After configuring the ports, the Circuit Manager feature of the SCM is used to build the connections to other modules.

1. Select **C** from the **M1-3 Main Menu**.

   The **M1-3 Configuration Menu** displays (Figure 2-3).

NOTE: *Configure the T3 port, then configure the T1 ports.*

Figure 2-3 M1-3 Configuration Menu

```
-- M1-3 CONFIGURATION MENU --

P) T3 port setup                Tn) T1 port setup
O) timing options               X)  exit this menu
```

DS3 Port Configuration

To configure the T3 port, select option **P**. The **DS3 Port Configuration Menu** displays (Figure 2-4).

Figure 2-4 DS3 Port Configuration Menu

```
-- M1-3 DS3 PORT CONFIGURATION MENU --

M) line type                    M13
H) coding type                  Bipolar
R) performance control          On
C) FEAC                         Disabled
I) inband control               Enabled
B) line build out               Normal Cable
E) equipment id
L) location id
F) frame id
U) unit id
A) facility id
P) port id
G) test Signal id
X) exit this menu
```

1. Line Type—Type “M” to set the line type. Select M1-3 because the carrier is splitting the T3 into T1s within its backbone network.

2. Line Coding—This option must use the default, Bipolar. Unipolar is not supported and will prevent data transfer.

3. FEAC (far end control)—Type “C” disable FEAC.

4. Inband Control—This example uses the default Enable because this ensures far-end control regardless of carrier routing.

NOTE: *No further menu options are required for this example setup.*

T1 Port Configuration

Up to 28 T1s can be multiplexed onto the DS3 port. Each T1 can have a unique configuration. Each T1 port is connected via a circuit to another AS3000 application module's port.

Type "T8" (replace the *n* by a T1 port number, 1-28) to display the **M1-3 T1 Configuration Menu** (Figure 2-5).

Figure 2-5 T*n* Configuration Menu

```
-- M1-3 T1 PORT CONFIGURATION MENU --
    Port                        8
I)  in service                  yes
F)  frame format                ESF
T)  trunk condition bits(A/B)   1/1
X)  exit this menu
```

NOTE: *The menu always displays the menu caption "M1-3 T1 PORT" regardless of the T1 port configured.*

1. In service—Use the default, Yes. Circuits can not be built unless the port is enabled. However, place all unused T1 ports out of service to avoid extraneous error messages.

2. Frame Format—Select option **F** and select ESF. This is especially critical if digital voice is involved.

3. Repeat steps 1-3 for the remaining T1 ports you plan on configuring.

Timing Options

The M1-3 is the primary timing source in this example. Use the **Timing Options** menu and set the M1-3 timing options (Figure 2-6).

Figure 2-6 Timing Options Menu

```
-- M1-3 CONFIGURATION MENU (TIMING OPTIONS)--

Current shelf timing source: card 6, internal (primary)

Source       Slot Number   Synchronization   Auto Restore

Primary       PC) 6        PS) network      PA) yes
Secondary     SC) 4        SS) network      SA) yes
Tertiary      TC) 7        TS) internal     TA) yes

X) exit this menu
```

1. Select **PC** and set the M1-3 as the primary timing source for the shelf.

2. Select **PS** and set the synchronization for Network, indicating the M1-3 receives timing from the network.

3. Auto Restore— For this example use the default Yes. If the primary timing source fails (network timing or M1-3 failure), the secondary timing source assumes shelf timing. If the primary timing source returns to service, the M1-3 (primary source) assumes shelf timing when it resumes operation.

Alarm Menu

The **Alarm Menu** displays alarm reporting options (on/off) and the contents of the alarm buffer (reported alarms). From the **M1-3 Main Menu**:

1. Select the Alarm option, **A**.
2. Set network port alarm to Yes.

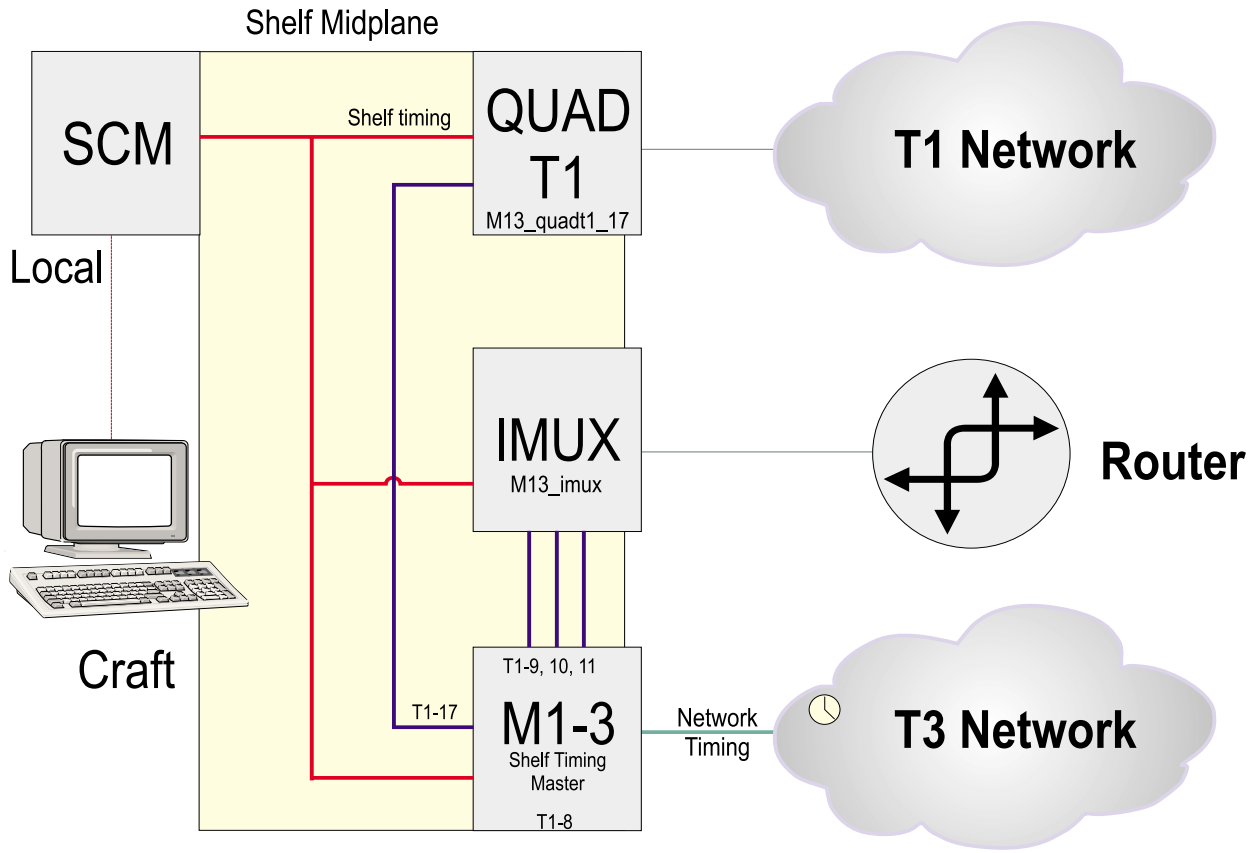
NOTE: *No further menu options are required for this example setup.*

Example Circuits

This section provides the details to create three type of M1-3 circuits in an MLS. As you read, the example uses multiple configurations and makes the following assumptions:

- That an SCM is in slot 1 with a shelf address of 1. An M1-3 is in slot 6 with the T3 and T1 ports configured, a QUAD T1 is in slot 3, and an IMUX module is in slot 5.
- The M1-3 T1 number 17 to the QUAD T1, net1.
- The M1-3, T1 number 9, 10, and 11 to the IMUX module.

Figure 2-7 Example Configuration



Configuration Sequence

The circuit options are configured in the following order if the M1-3 is the source port:

- Name
- Mode
- SP (source port)
- DP (destination port)
- ST (source T1, see Note)
- SM (source mapping)
- DM (destination mapping).

NOTE: *Circuit port options vary depending on the module, however this sequence is the general order of mapping for the M1-3. The menu option ST (Source T1) displays if the M1-3 is the source port. DT (destination T1) displays if the M1-3 is the destination port.*

M1-3 to QUAD T1

To map the M1-3, T1 number 17 to the QUAD T1, net port 1, do the following:

1. Start from the **Circuit Build Manager** menu, type “A” (**Add Circuit)**.

Figure 2-8 Add Circuit Menu

```
-- ADD CIRCUIT MENU [1,1] SCM  Firmware 1.18 --

 N) name: --                          M) mode: --

SP) src port: [-,-] undefined      DP) dst port: [-,-] undefined
    --port rate selection--             --port rate selection--
    ( undefined port )                  ( undefined port )
    ( undefined port )                  ( undefined port )
    ( undefined port )                  ( undefined port )
    ( undefined port )                  ( undefined port )

    bus: AUT    ->-->>->> Circuit Inactive <<-<<--<-

 S) setup                             X) exit

A [0.0.0.2] [1,1] SCM >
```

2. From the **Add Circuit Menu** type “N”.

   Type a name for the M1-3 to QUAD T1 circuit (for example “m13_17_quadt1_1”).

3. Type “M”. Type “1” (only 64k mode is supported) .

4. Type “SP” (source port). Enter the shelf number, a comma, and the slot number of the M1-3 (1,6).

5. Type “DP” (destination port). Type the shelf number, a comma, and the slot number for the QUAD T1 (1,3). Type “1” (net1).

6. Type “ST” (source T1). Choose T1 number 17.

7. From the **Add Circuit Menu** select option “SM” (source mapping). Choose timeslots 1 through 24 (1-24).

8. Type “DM” (destination mapping). Choose all 24 timeslots (1-24).

9. Type “S” to setup the circuit. A message appears **Successful Circuit Build**, then displays the **Edit Circuit Menu** (Figure 2-9).

Figure 2-9 Edit Circuit Menu After Circuit Setup

```
-- EDIT CIRCUIT MENU [1,1] SCM  Firmware 1.18 --

 N) name: m13_17_qt1_1              M) mode: 64k

SP) src port: [1, 6] M1-3 m13      DP) dst port: [1, 3] QUAD net1
SM) -- DS0 map selection --        DM) -- DS0 map selection --
    01 02 03 04 05 06 07 08            01 02 03 04 05 06 07 08
    09 10 11 12 13 14 15 16            09 10 11 12 13 14 15 16
    17 18 19 20 21 22 23 24            17 18 19 20 21 22 23 24
ST) T1 chnl No. 17

    bus: AUT   ->-->>->> Running on Bus A.1 <<-<<--<-

 S) setup                           X) exit

A [0.0.0.2] [1,1] SCM >
```

Exit to the **Circuit Manager Menu** with the **X** command.

M1-3 to IMUX

This example maps the M1-3, T1 number 9, 10, and 11, to the IMUX module in slot 5.

1. From the **Add Circuit Menu** type “N” (name circuit).

   Provide a name for a new M1-3 to IMUX circuit (for example m13_imux).

2. Type “M” (mode), type “1”, (64k).

3. Type “SP” (source port). Enter the shelf number, a comma, and the slot number of the M1-3 (1,6).

4. Type “DP” (destination port). Type the shelf number, a comma, and the slot number for the IMUX (1,5).

5. Type “ST” (source T1) and choose T1 number 9, 10, and 11 (9-11).

6. Type “S” (setup). Type “S” to setup the circuit. A message should appear **Successful Circuit Build** then display the **Edit Circuit Menu** (Figure 2-10).

Figure 2-10 M1-3 to IMUX Circuit Setup

```
   -- EDIT CIRCUIT MENU [1,1] SCM  Firmware 1.18 --

    N) name: m13_imux2                M) mode: 64k

   SP) src port: [1, 6] M1-3 m13     DP) dst port: [1, 5] IMUX data
   ST) -- T1 map selection --            -- port data rate --
       .. .. .. .. .. .. .. ..
       09 10 11 .. .. .. .. ..           [ 1528k * 3 = 4584 kbps ]
       .. .. .. .. .. .. .. ..
       .. .. .. ..

       bus: AUT

    S) setup                          X) exit

   A [0.0.0.2] [1,1] SCM >
```

7. Type “X” to exit the **Circuit Manager Menu**. This menu displays all configured and setup circuits (Figure 2-11).

Figure 2-11 Circuit Manager Menu with Three Circuits

```
-- CIRCUIT MANAGER MENU [1,1] SCM  Firmware 1.12 --

  Page : 1
  Total: 3 circuits

 Name         Type Mode  Prio    Source Port         Dest Port       Bus  Status
------------ ---- ----  ----  ----------------  ----------------  ---  ------
m3_17_qt1    perm 64k   norm  [1, 6] M1-3 m13   [1, 3] QUAD net1  AUT  Active
m13_imux2    perm 64k   norm  [1, 6] M1-3 m13   [1, 5] IMUX data  AUT  Active

 A) add circuit                  L) search circuit
 D) delete circuit               E) edit circuit

 P) prev page                    I) activate circuit
 N) next page                    R) deactivate circuit

 X) exit this menu

A [0.0.0.2] [1,1] SCM >
```

Additional Information

Once the QUAD T1 and IMUX modules are connected at the remote sites, the front panel LEDs for each port in service should turn green within 30 seconds. If it appears that there are problems, or for information on testing the new facility, see Chapter 5, "M1-3 Diagnostics”.

Detailed information on each configuration option is provided in Chapter 3, "M1-3 Configuration Options".

Once the M1-3 module has been in service for at least 15 minutes, meaningful information can be found in the performance registers. It is suggested that the performance registers be reset after the completion of an installation—in this way, errors accumulated before the installation was completed will not be interpreted as line errors. See Chapter 4, "Performance Monitoring" for information on the performance reporting options.

Chapter
3

M1-3 Configuration Options

The M1-3 menu options provide module access for the following tasks:

- Node and circuit configuration
- Activating and deactivating the node and circuit
- Setting alarms

NOTE: *The options shown in this chapter depict options displayed through the SCM Craft interface.*

M1-3 Management

The M1-3 module is designed to operate with an SCM module. The **SCM Main Menu** displays the contents of the shelf slots in a selected node. In the **SCM Main Menu**:

- An "M" at the intersection of rows and columns designates the shelf/slot location of an M1-3 module.
- The letter "S" displays where SCM modules are located.
- The letter surrounded by brackets **[ ]** designates the location of the currently active module that can be referenced and modified via submenus of the SCM **Main Menu**.
- On initial log in, the brackets surround the module used as the log-in access point (for example, the SCM).
- The **SCM Main Menu,** option **S** (shelf/slot) is used to move to a desired module in the node.

In Figure 3-1, the **SCM Main Menu** shows an M1-3 (designated by "M") in slot 6. From the shelf/slot command, the currently accessed module indicated by the square brackets **[ ]** has been changed to the M1-3 in slot 1.

The asterisk next to the "*S" indicates which SCM module is the node master. The "A" at the beginning of the prompt indicates the SCM you are accessing is the active SCM master.

Terminal Access

To access the M1-3 from an ASCII terminal:

1. Connect the ASCII terminal to the SCM front panel LOCAL port.
2. Set the ASCII terminal parameters to the following values:
   - 19.2 kbit/s
   - 8 data bits
   - no parity
   - one stop-bit
   - no flow control

NOTE: *Ensure that* X-ON/X-OFF *flow control is disabled.*

3. Type "craft" and press ENTER.
4. At the password prompt, type the password **systest** (lower case) and press ENTER.

The **SCM Main Menu** displays (Figure 3-1).

Figure 3-1 SCM/M1-3 Main Menu

```
-- VERILINK SCM CONTROLLER : FW Rev 1.17, Aug 18 1998 15:36:44   --

   Site name:  SCM Tutorial                  Access level:  4
   Managing at NEAR end node [0.0.0.2]            Node id:  122

                          <- SLOT ->
 SHELF   1   2   3   4   5   6   7   8   9   10  11  12  13
   0     -   -   -   -   -   -   -   -   -   -   -   -   -
   1 M  *S   D   Q   Q   I  [M]  -   -   -   -   -   -   -
   2     -   -   -   -   -   -   -   -   -   -   -   -   -
   3     -   -   -   -   -   -   -   -   -   -   -   -   -
   4     -   -   -   -   -   -   -   -   -   -   -   -   -
KEY: D=QUAD D, I=IMUX, M=M1-3, Q=QUAD T1, S=SCM

S) shelf/slot                O) administration
C) configuration             D) diagnostics
P) performance/status        F) display far end DS3 port identification
B) circuit manager           A) alarm
R) remote end setup          I) manufacturing info
X) logoff

A [0.0.0.2] [1,6] M1-3 >
```

M1-3 Access

From the **SCM Main Menu** select the MLS shelf slot position for the M1-3. The M1-3 slot is denoted with an "M". Type "S" and press ENTER, then type the shelf number and slot number and press ENTER (1,6 for example).

M1-3 Configuration Menu

To access the **M1-3 Configuration Menu** type "C" and press ENTER. The **M1-3 Configuration Menu** (Figure 3-2) displays.

Figure 3-2 M1-3 Configuration Menu

```
-- M1-3 CONFIGURATION MENU --

P) T3 port setup              Tn) T1 port setup
O) timing options             X)  exit this menu
```

The **M1-3 Configuration Menu** provides three options. Table 3-1 defines these options.

Table 3-1 M1-3 Configuration Menu

Command	Description
P	Accesses the T3 Port Setup Menu
T*n* (where *"n"* is the port number)	Accesses the T1 Port Setup Menu
X	Exit this menu

DS3 Port Configuration Menu

The M1-3 ports require configuration before signals can be transmitted and received. From the **M1-3 Configuration Menu**, press "P" and ENTER.

The **Port Configuration Menu** displays. Figure 3-3 and Table 3-2 describe the **T3 Port Configuration Menu** options.

Figure 3-3 M1-3 DS3 Port Configuration Menu

```
-- M1-3 DS3 PORT CONFIGURATION MENU --

M) line type                    M13
H) coding type                  Bipolar
R) performance control          On
C) FEAC                         Enabled
D) clock                        Network
I) inband control               Enabled
B) line build out               Normal Cable
E) equipment id                 ten bytes
L) location id                  allows 11
F) frame id                     ten bytes
U) unit id                      unit06
A) facility id                  up to thirty eight bytes
P) port id                      38 character field!
G) test Signal id               38 bytes here too
X) exit this menu
```

Table 3-2 M1-3 DS3 Port Configuration Menu Options

Command	Description	Option
M	Line Type—must match what the telco assigns. • C-bit—In the DS3 C-bit parity format the C-bits are available to provide in-service, end-to-end path performance monitoring of the DS3 signal, and in-band data links. C-bit line type is available when all multiplexing occurs within one mux, as in the M1-3. • M1-3—Asynchronous framing format that uses all 21 DS3 C-bits for bit stuffing. The standard M1-3 format cannot provide end-to-end parity information. Use this format if the DS3 is split by your telco to multiple far-end locations.	C-Bit M1-3
H	Coding Type—displays the line options. This option is carrier-specific when operating on a standard T3 network. • Bipolar—A T-carrier line-coding system. This system alternates the polarity of consecutive ones bits. This is the normal option. • Unipolar—A signal stream in which all one bits are the same polarity. Intended for use with fiber optics networks. NOTE: Only bipolar is currently supported.	Bipolar Unipolar
R	Performance Control—enables/disables performance control. This option is usually enabled for DS3 except during initialization.	Enable Disable
C	Far End Control (FEAC)—enables or disables node control at the far end using a DS3 C-bit subframe. This channel is also used to initiate loopbacks at the far-end terminal from the near-end terminal.	Enable Disable

Command	Description	Option
D	DS3 Clock—Clock source for the module selected from 2 options.	Network Internal
I	Inband Control—enables or disables the inband control. Inband control uses part of the T3 overhead for far end control. This option ensures control regardless of carrier routing.	Enable Disable
B	Line Build Out—displays the line build out options. • Normal = less than 250 feet to the first repeater. • Long = more than 250 feet to the first repeater.	Normal Long
E	Equipment ID—displays an optional 10-character field to enter an ID for the equipment connected to the M1-3.	
L	Location ID—displays an optional 11-character field to enter the location ID.	
F	Frame ID—displays an optional 10-character field to enter the frame ID.	
U	Unit ID—displays an optional 6-character field to enter the M1-3 unit ID.	
A	Facility ID—displays an optional 38-character field to enter the facility ID.	
P	Port ID—displays an optional 28-character field to enter the port ID.	
G	Test Signal ID—displays an optional 38-character field to enter the generator ID.	
X	Exit this menu.	

T1 Port Configuration Menu

To set T1 port configuration from the **M1-3 Configuration Menu**, type “T” and select the DS3 timeslot number (1-28). Up to 28 T1s can be multiplexed onto the DS3 port. Each T1 can have a unique configuration. Each T1 port is connected via a circuit to another AS3000 application module’s port.

Figure 3-4 shows a sample menu for the first T1 in the DS3 circuit, shown as Port 1. Table 3-3 defines the **M1-3 Port Configuration Menu** options.

Figure 3-4 M1-3 T1 Port Configuration Menu

```
-- M1-3 T1 PORT CONFIGURATION MENU --
    Port                        1
I)  in service                  yes
F)  frame format                ESF
T)  trunk condition bits(A/B) 0/0
X)  exit this menu
```

Table 3-3 M1-3 T1 Port Configuration Menu

Command	Description
Tn	Port—The DS3 slot assigned to this T1. The value is 1—28.
I	Service Mode—displays the Mode Control options submenu.
F	Frame Format: Choose SF (Superframe) or ESF (Extended Superframe Format) as dictated by what your installation supports. 1) SF—Provides traffic/signaling and framing. 2) ESF—T1 framing standard providing frame synchronization, cyclic redundancy check, traffic signaling, data checking, and link bits (Facility Data Link, or FDL).
T	Trunk Condition bits—Used to signal a PBX when line service is unavailable for voice. Available options are 0/0, 1/0, 0/1, 1/1. Note: This option can only be changed when the ports are in normal service. The act of conditioning the bits must stop before the state change can occur.
X	Exit this menu.

Timing Options

Select **Timing Options** from the **M1-3 Configuration Menu** to view the current shelf timing table. You can set the shelf timing master, secondary, and tertiary timing sources. Figure 3-5 shows the M1-3 set as the current timing master.

NOTE: *If you make any changes in this menu, the changes affect the timing for all modules in the shelf.*

Set the timing synchronization to one of the following options:

- network
- external
- internal

Set the auto restore options to Yes or No.

Figure 3-5 T*n* Timing Options Menu

```
-- M1-3 CONFIGURATION MENU (TIMING OPTIONS)--

Current shelf timing source: card 6, internal (primary)

Source       Slot Number   Synchronization   Auto Restore

Primary       PC) 6        PS) internal    PA) yes
Secondary     SC) 4        SS) internal    SA) yes
Tertiary      TC) 7        TS) internal    TA) yes

X) exit this menu
```

Table 3-4 Timing Menu Options

Menu Option	Description	Instructions
PC	Primary Clock—The slot number of the application module that is the primary clock source for this shelf. This module provides the clock signal used to drive the transmit clock circuitry for all modules in the shelf that use T1 rate clocks.	At the prompt, type the slot number of the module selected as the primary clock source.
PS	Primary Synchronization—Sets the timing source for the module selected as the shelf timing master. Options: • Network—receives clock from the network. • Internal—generates clock with it own circuitry. • External—receives clock from a timing source connected to the rear connector module.	Select from the list of timing sources available to the module: Network, internal, or external.
PA	Primary Auto-restore—Enables or disables fallback to primary clock source after a failed condition has cleared. If disabled, the SCM cannot use the primary clock source until this option is enabled.	Set to Yes if the node is to revert to a timing source that failed and recovered.
SC	Secondary Clock—The slot number of the application module that is the secondary clock source for this shelf. If the primary clock source fails, this module provides the clock signal used to drive the transmit clock circuitry for all modules in the shelf using T1 rate clocks.	At the prompt, type the slot number of the module selected as the secondary clock source.
SS	Secondary Synchronization—Clock source within the module selected as the secondary timing source. See PS option in this table.	Select from the list of timing sources available to the module: Network, internal, or external.
SA	Secondary Auto-restore—Enables or disables fallback to a secondary clock source after a failed condition has cleared. If disabled, the SCM cannot use the secondary clock source until this option is enabled.	Set to Yes if the node is to revert to a timing source that failed and recovered.
TC	Tertiary Clock—The slot number of the application module that is the tertiary (third) clock source for this shelf. If both the primary and secondary clock sources fail, this module provides the clock signal used to drive the transmit clock circuitry for all modules in the shelf using T1 rate clocks. Same options as the primary source.	At the prompt, type the slot number of the module selected as the secondary clock source.
TS	Tertiary Synchronization—Clock source within the module selected for the TC option. See PS option.	Select from the list of timing sources available to the module: Network, internal, or external.
TA	Tertiary Auto-restore—Enables or disables fallback to tertiary clock source after a failed condition has cleared. If disabled, the SCM cannot revert to the If disabled, the SCM cannot use the tertiary clock source until this option is enabled.	Set to Yes if the node is to revert to a timing source that failed and recovered.
X	Return to the **M1-3 Port Configuration Menu**.	

Performance/Status Menu

The **Performance/Status Menu** is used to set and monitor M1-3 performance. A predetermined value for an alarm condition is set in the **Threshold Setting** submenu. When the number of errors exceed the predetermined value within the time constraint (15-minute and 24-hour), an alarm is reported.

You can access the M1-3 **Performance/Status Menu** from the **M1-3 Main Menu** (Figure 3-1).

Figure 3-6 M1-3 Performance/Status Menu

```
-- M1-3 PERFORMANCE/STATUS MENU --

T) threshold setting          R) report selection
X) exit this menu
```

Performance Threshold Menu

The threshold setting option displays the **M1-3 Performance Threshold Menu** (Figure 3-7) where you can change the default 15-minute and 24-hour DS3 threshold values. See Figure 3-8 and Figure 3-11 for the **Threshold Settings Menus** and Table 3-5 for a description of the performance parameters.

Figure 3-7 Performance Threshold Menu

```
 -- M1-3 PERFORMANCE THRESHOLD MENU --

 M) 15 minute threshold        H) 24 hour threshold
 X) exit this menu
```

Threshold Menu

The example in Figure 3-8 shows the **15-minute Threshold Menu**. To set or change the values within the **Threshold Menu** (15-minute or 24 hour):

1. Type the desired key selection (for example, type “A” to set the FE_CCV value in Figure 3-8) and press ENTER.
2. Type the new value and press ENTER.

   The **15-Minute Threshold Menu** displays the new value.

Figure 3-8 15-Minute Threshold Menu

```
-- M1-3 15 MINUTE THRESHOLD MENU --

A) FE_CCV          382     B) FE_CES           86
C) FE_CSES           4     D) FE_LUAS          10
E) NE_LCV          387     F) NE_LES           86
G) NE_LSES           4     H) NE_PCV          382
I) NE_PES           86     J) NE_PSES           4
K) NE_CCV          382     L) NE_CES           86
M) NE_CSES           4     N) NE_SEFS           2
O) NE_AISS           2     P) NE_LUAS          10
Q) NE_LOSS           2     R) NE_LOFS           2
X) exit this menu
```

Figure 3-9 24-Hour Threshold Menu

```
-- M1-3 24 HOUR THRESHOLD MENU --

A) FE_CCV            0     B) FE_CES            0
C) FE_CSES           0     D) FE_LUAS           0
E) NE_LCV            0     F) NE_LES            0
G) NE_LSES           0     H) NE_PCV            0
I) NE_PES            0     J) NE_PSES           0
K) NE_CCV            0     L) NE_CES            0
M) NE_CSES   353472512     N) NE_SEFS           1
O) NE_AISS           0     P) NE_LUAS   185145344
Q) NE_LOSS           1     R) NE_LOFS  2130337792
X) exit this menu
```

NOTE: *The M1-3 default values shown in Figure 3-8 are defaults established by Bellcore Technical Reference, OTGR 5.1, TR-TSY-000820.*

Performance Parameters Description

Table 3-5 defines the acronyms found in the **Threshold Menus**.

Table 3-5 DS3 Performance Parameters

Command	Description
A	FE_CCV—Far End C-bit Coding Violations error event. Displays the far-end count of C-bit parity errors occurring during the designated time interval.
B	FE_CES—Far End C-bit Errored Seconds. Displays a far-end second with one or more CCVs, or one or more Out-Of-Frame errors or incoming AISs (Alarm Indication Signals).
C	FE_CSES—Far End C-bit Severely Errored Seconds. Displays a far-end second with 44 or more CCVs or one or more Out-Of-Frame errors or incoming AISs (Alarm Indication Signals).

Command	Description
D	FE_LUAS—Far End Local Unavailable Second. Displays a far-end unavailable second during which the DS3 port at the far end is not receiving data from the near-end.
E	NE_LCV—Near End Line Coding Violation. Displays a near-end bipolar violation event or an excessive zeros event.
F	NE_LES—Near End Line Errored Seconds. Displays a second in which one or more coding violations, or one or more Loss Of Signal errors occurred.
G	NE_LSES—Near End Line Severely Errored Seconds. A second during which the NE was (at any point during the second) in the AIS (Alarm Indication Signal) state.
H	NE_PCV—Near End P-bit Coding Violation. A P-bit Parity Error event is the occurrence of a received P-bit code on the DS3 M-frame that is not identical to the corresponding locally-calculated code.
I	NE_PES—Near End P-bit Errored Seconds. Displays a second with one or more PCVs, or one or more Out-Of-Frame errors or incoming AISs (Alarm Indication Signals).
J	NE_PSES—Near End P-bit Severely Errored Seconds. Displays a second with 44 or more PCVs, or one or more Out-Of-Frame errors or incoming AISs (Alarm Indication Signals).
K	NE_CCV—Near End C-bit Coding Violation. Displays the near end count of C-bit parity errors occurring in the accumulation interval.
L	NE_CES—Near End C-bit Errored Seconds. Displays a near-end second with one or more CCVs, or one or more Out-Of-Frame errors or incoming AISs (Alarm Indication Signals).
M	NE_CSES—Near End C-bit Severely Errored Seconds. Displays a near-end second with 44 or more CCVs or one or more Out-Of-Frame errors or incoming AISs (Alarm Indication Signals).
N	NE_SEFS—Near End Severely Errored Framing Seconds. Displays a near end second with one or more Out-Of-Frame defects or incoming AISs (Alarm Indication Signals).
O	NE_AISS—Near End Alarm Indication Signal. A second during which the unit receives an all-ones (Alarm Indication Signal) code from the network.
P	NE_LUAS—Near End Local Unavailable Second. Displays a near-end unavailable second during which the DS3 port at the near end is not receiving data from the far-end.
Q	NE_LOSS—Near End Loss of Signal Second. The number of seconds in which the unit is in a Loss-Of-Signal-Second state.
R	NE_LOFS—Near End Loss of Frame Second. The total number of seconds the unit was in an Loss-Of-Frame state.
X	Exit this menu.

Performance Report

Access the **M1-3 Performance Report Menu** from the **Performance/Status Menu**. The **M1-3 Performance Report Menu** (Figure 3-10) displays the number of times in a 15-minute, 1-hour, or 24-hour period that an alarm is reported by the M1-3. See Table 3-5 for the definition of the register report acronyms.

Figure 3-10 Performance Report Menu

```
-- M1-3 PERFORMANCE REPORT MENU --

M) 15 minute report            O) one hour report
H) 24 hour report              R) reset registers
X) exit this menu


A [0.0.0.2] [1,6] M1-3 >
```

Figure 3-11 shows the **M1-3 Performance Report Menu** and a 15-minute report with 4 FE_CCV (Far End C-bit Coding Violations), and 18 NE_LOFS (near end loss of frame second) alarms. The threshold value for the FE_CCV and NE_LOFS were exceeded four times and eighteen times respectively in a 15-minute period.

Figure 3-11 15 Minute Performance Data Display

```
-- M1-3 15 MINUTE PERFORMANCE DATA --

Site Name: SCM Tutorial           Shelf:  1  Slot:  6

Register        Count           Register        Count

FE_CCV :            4           NE_PSES :           0
FE_CES :            0           NE_CCV :            0
FE_CSES :           0           NE_CES :            0
FE_LUAS :           0           NE_CSES :           0
NE_LCV :            0           NE_SEFS :           0
NE_LES :            0           NE_AISS :           0
NE_LSES :           0           NE_LUAS :           0
NE_PCV :            0           NE_LOSS :           0
NE_PES :            0           NE_LOFS :          18

Press Enter to continue
```

Table 3-6 Performance Report Menu Options

Command	Description
M	15-minutes—Displays the number of errors reported by the M1-3 in the previous 15-minute period.
H	1 Hour—Displays the type and number of errors in the previous one-hour period divided into quarter hour columns (Figure 3-12).
O	24 Hour—Displays the M1-3 24 Hour Report Menu (Figure 3-13). This menu provides access to individual circuit performance data (Figure 3-14) in 96, 15-minute intervals (the number of 15-minute intervals in a 24 hour period). These performance reports are defined in Table 3-5.
R	Reset Registers—Resets the report registers to zero.
X	Exit this menu.

Figure 3-12 M1-3 One Hour Performance Data Display

```
-- M-13 1 HOUR PERFORMANCE DATA --

Site Name: Verilink Technical              Shelf:  3  Slot:  2

Reg               Cur        Q1         Q2         Q3         Q4

FE_CCV            0          0          0          0          0
FE_CES            0          0          0          0          0
FE_CSES           0          0          0          0          0
FE_LUAS           0          0          0          0          0
LCV               0          0          0          0          0
LES               0          0          0          0          0
LSES              0          0          0          0          0
PCV               0          0          0          0          0
PES               0          0          0          0          0
PSES              0          0          0          0          0
CCV               0          0          0          0          0
CES               0          0          0          0          0
CSES              0          0          0          0          0
SEFS              0          0          0          0          0
AISS              0          0          0          0          0
LUAS              0          0          0          0          0
LOSS              0          0          0          0          0
LOFS            860        580          0          0          0

A [0.0.0.2] [3,2] HSM 3113 >
```

Figure 3-13 M1-3 24 Hour Report Menu

```
-- M1-3 24 HOUR REPORT MENU --

A) FE_CCV                       B) FE_CES
C) FE_CSES                      D) FE_LUAS
E) NE_LCV                       F) NE_LES
G) NE_LSES                      H) NE_PCV
I) NE_PES                       J) NE_PSES
K) NE_CCV                       L) NE_CES
M) NE_CSES                      N) NE_SEFS
O) NE_AISS                      P) NE_LUAS
Q) NE_LOSS                      R) NE_LOFS
X) exit this menu

A [0.0.0.2] [1,6] M1-3 >
```

Figure 3-14 M1-3 24 Hour FE_CCV Performance Data Menu

```
-- M1-3 24 HOUR FE_CCV PERFORMANCE DATA --

Site Name: SCM Tutorial                    Shelf:  1  Slot:  6
FE_CCV in current interval: 0
FE_CCV in 24 hours: 0             Valid Intervals: 17

 1: 0       17: 0       33: -       49: -       65: -       81: -
 2: 0       18: -       34: -       50: -       66: -       82: -
 3: 0       19: -       35: -       51: -       67: -       83: -
 4: 0       20: -       36: -       52: -       68: -       84: -
 5: 0       21: -       37: -       53: -       69: -       85: -
 6: 0       22: -       38: -       54: -       70: -       86: -
 7: 0       23: -       39: -       55: -       71: -       87: -
 8: 0       24: -       40: -       56: -       72: -       88: -
 9: 0       25: -       41: -       57: -       73: -       89: -
10: 0       26: -       42: -       58: -       74: -       90: -
11: 0       27: -       43: -       59: -       75: -       91: -
12: 0       28: -       44: -       60: -       76: -       92: -
13: 0       29: -       45: -       61: -       77: -       93: -
14: 0       30: -       46: -       62: -       78: -       94: -
15: 0       31: -       47: -       63: -       79: -       95: -
16: 0       32: -       48: -       64: -       80: -       96: -

Press Enter to continue
```

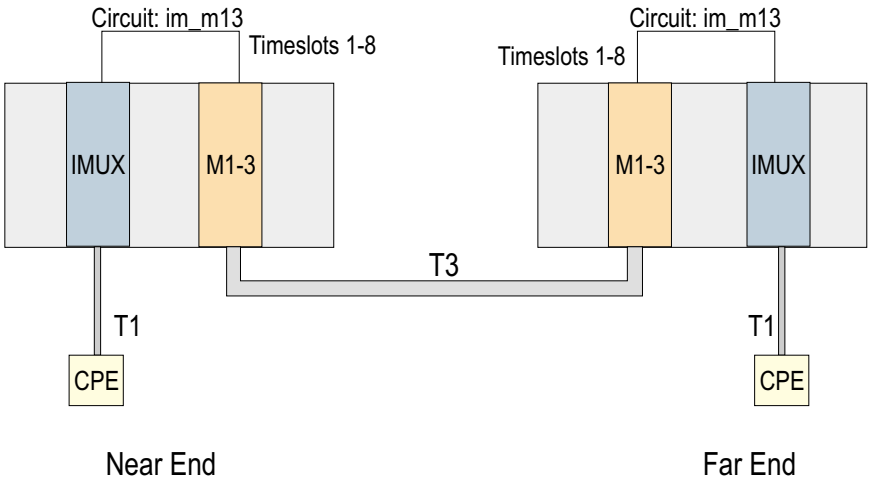
Circuit Manager

Circuit building is a primary function of the SCM controller module. For information on circuit building, refer to the *SCM User Manual*. Figure 3-15 shows an example of an M1-3 circuit. Only 64K circuits are supported.

The DT option in Figure 3-15 shows the T1s used in this T3 port. Each T1 can have a unique configuration.

Figure 3-15 M1-3 to IMUX Circuit

```
    -- ADD CIRCUIT MENU  [0,1]  SCM Firmware 1.17 --

 N) name:  im_m13                      M) mode: 64k
SP) src port: [0,7] IMUX data

   - - port data rate - -
   [ 1536 * 8 = 12288 kbps ]          DP)  dst port:  [0,10]  HSM  m13
                                      DT)  - - T1 map selection - -
   Bus:  AUT                             01  02  03  04  05  06  07  08
                                         ..  ..  ..  ..  ..  ..  ..  ..
 S) setup                                ..  ..  ..  ..  ..  ..  ..  ..
                                         ..  ..  ..

A [127.127.127.67]  [0,1] SCM>
```



Card Administration

The commands on the **Card Administration Menu** generates prompts that are designed to be self-explanatory and/or contain multiple choice options. Figure 3-16 shows the **M1-3 Card Administration Menu**. Table 3-7 defines the menu options.

Figure 3-16 M1-3 Card Administration

```
-- SCM CONTROLLER ADMINISTRATION MENU --

Date/Time/Zone:               8-13-98  19:59:57 PST
Node address:                 [0.0.0.2]
Node id:                      122
Site name:                    SCM Tutorial
System uptime:                70:19:43

 -- M1-3 -- CARD ADMINISTRATION -- [01,06] --

O) switch over permanent
P) change password
Q) query firmware
R) reset card
Y) switch over once
F) re-download firmware from SCM
I) change site name
X) exit this menu
```

Table 3-7 M1-3 Card Administration

Command	Description
O	Switch over permanent—Selects a partition of memory to be loaded into RAM and executed. Once specified, the permanent partition of the flash is reloaded and executed following each power cycle. The permanent status remains until altered.
P	Calls a submenu with options used to view and change passwords: **D**) Set Default Passwords—Resets all three password levels to their factory default values. **A**) Set Superuser Password —Sets password for access level 3. **P**) Set Privileged User Password—Sets password for access level 2. **U**) Set Unprivileged User Password—Sets password for access level 1. **W**) Display 3 Levels of Password—Shows current passwords for Unpriveleged, Priveleged and Superuser access levels. Superuser Password: sutest; Privileged User Password: tech; Unprivileged User Password: ENTER. See *SCM User Manual* for password information.
Q	Query firmware—Produces a display showing the firmware versions currently residing in both flash banks as well as indicating which version is currently operating in RAM.
R	Reset card—Reinitializes the operation of firmware currently in RAM.
Y	Switch over once—Selects a partition of memory that is loaded into RAM and executed, overriding the permanent status of the other partition. During the next power cycle, the last referenced permanent partition reloads into RAM.
F	Re-download firmware from SCM—Used to request a download of new M1-3 firmware from the local SCM. The new file must already reside in the RAM of the SCM. See the SCM for more information on firmware upgrades.
I	Change site name—displays 19-character field to change the site name of the M1-3.
X	Exit this menu.

Far End DS3 Port Identification

From the **M1-3 Main Menu** (Figure 3-17) the **Display Far End DS3 Port Identification** option displays the **Far-End Port Identification Information Menu** (Figure 3-18). This menu is available when the M1-3 line type is configured for M1-3 or C-bit framing. This information can be useful for locating equipment when troubleshooting network problems. The values are entered using this menu.

Figure 3-17 M1-3 Main Menu

```
-- VERILINK SCM CONTROLLER : FW Rev 1.18, Aug 24 1998 18:32:05   --

   Site name:  SCM Tutorial                  Access level:  4
   Managing at NEAR end node [0.0.0.2]            Node id:  122

                          <- SLOT ->
 SHELF   1   2   3   4   5   6   7   8   9   10  11  12  13
   0     -   -   -   -   -   -   -   -   -   -   -   -   -
   1 M  *S   D   Q   Q   I  [M]  -   -   -   -   -   -   -
   2     -   -   -   -   -   -   -   -   -   -   -   -   -
   3     -   -   -   -   -   -   -   -   -   -   -   -   -
   4     -   -   -   -   -   -   -   -   -   -   -   -   -
KEY: D=QUAD D, I=IMUX, M=M1-3, Q=QUAD T1, S=SCM

S) shelf/slot                O) administration
C) configuration             D) diagnostics
P) performance/status        F) display far end DS3 port identification
B) circuit manager           A) alarm
R) remote end setup          I) manufacturing info
X) logoff

A [0.0.0.2] [1,6] M1-3 >
```

Figure 3-18 Display Far-End and DS3 Port Identification Menu

```
--- FAR END PORT IDENTIFICATION INFORMATION ---

Equipment id    :
Location id     :
Frame id        :
Unit  id        :
Facility id     :
Port id         :
Generator id    :
```

Alarm Menu

From the **M1-3 Main Menu**, the **M1-3 Alarm Menu** displays alarm reporting options (enabled/disabled) and the contents of the alarm buffer (Figure 3-20). After initial configuration, enable the **Card Alarm Reporting** option.

To access the **M1-3 Alarm Menu**, type "A" and press ENTER.

Figure 3-19 M1-3 Alarm Menu

```
-- M1-3 ALARM MENU --

A) card alarm reporting       Yes
N) network port alarm         no
O) display alarm buffer

X) exit this menu
```

Table 3-8 M1-3 Alarm Menu

Command	Description
A	Card Alarm Reporting—Enables/disables alarm reporting. This option is generally set to Yes.
N	Network Port Alarm—Enables/disables the network port alarm. This option is generally set to Yes.
O	Display Alarm Buffer—Displays only the M1-3 reported alarms (Figure 3-20).
X	Exit this menu.

Figure 3-20 M1-3 Display Alarm Buffer

```
A [0.0.0.2] [1,6] M1-3 > o
* 0.0.0.2          M1-3         [01,06] Minor alarm          M13 T1 Ch 255
   (1/4 hour)DS3 LOFS alert cross the threshold              8-26-98   4:23:06

-- MORE -- ('q' to quit)
```

Table 3-9 Alarm Buffer Reporting Fields

Alarm Field	Definition
0.0.0.2	Displays the Node address.
M1-3	Displays the application module reporting the alarm to the SCM.
[01,06] Minor Alarm	Displays the shelf and slot number of the reporting application module, and the type/status of the alarm.
M13 T1 Ch255 **8-26-98 4:23:06**	Displays the specific T1 and channel generating an alarm Displays the date and time the alarm is reported.
(1/4 hour)DS3 LOFS alert cross the threshold	This field is informational. It displays the action that changed the status of a module or node.

Chapter 4

Performance Monitoring

This chapter defines the M1-3 front panel LED indications and the **Performance/Status Menu** report registers. M1-3 performance can be monitored with the aid of:

- Front Panel LEDs
- Performance/Status Menus

The M1-3 provides a statistics buffer that stores event data. The event data thresholds are configured in the **Performance/Status Threshold Setting** submenu.

When a threshold setting is exceeded, the M1-3 stores that data in the statistics buffer. If the M1-3 encounters an error, it notifies the SCM of an alarm condition. Both the SCM and the M1-3 display an alarm indication (LEDs).

NOTE: *The alarm LED color is dependent on the type of alarm.*

M1-3 LED Indicators

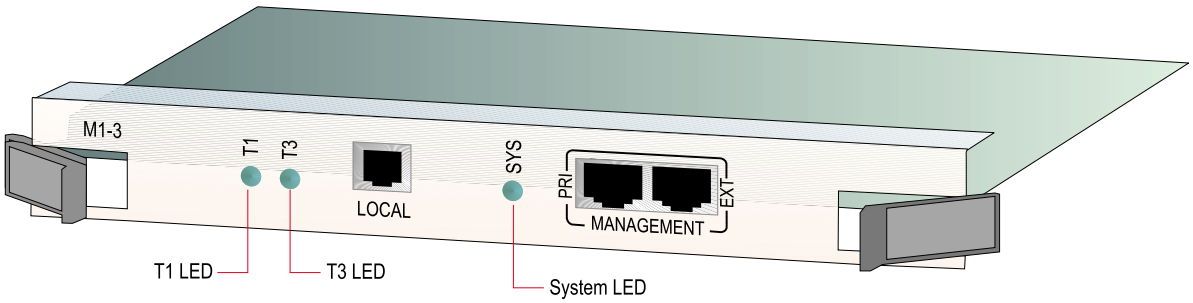
The M1-3 front-panel LED indicators change color to indicate when errors are found at the T3 or T1 line (red or amber) or system equipment problems (red). Errors are recorded in the status report of the **Performance/Status Menu.** The are three M1-3 LEDs:

- T3 port
- T1 port
- System

Power On Self Test

The M1-3 front-panel LED indicators flash red and green in rapid succession during self test. The firmware implements a power-on self-test (POST) each time the M1-3 is powered. The POST implementation validates the functionality of each major hardware subsystem in less than 10 seconds.

Figure 4-1 M1-3 Front Panel LED Indicators



T3 Port LED

The T3 LED displays major and critical alarms detected at the T3 port and the T1 on the midplane. The T3 LED also displays T3 loopback status.

Table 4-1 T3 LED Indicator

State	Color	Alarm Class	Action/Error Condition
Solid	Green	All okay	None.
Solid	Amber	Diagnostic mode, T3 loopback enabled.	Check the diagnostic performance status or alarm status screens using the **Performance/Status Menu** to view loopback results.
Flashing	Amber to red	Major	Loopback/testing in progress and errors are encountered.
Solid	Red	Major/critical	T3 alarm condition(s) exist. Check the performance status or alarm status screens using the **Performance/Status Menu** to determine the cause of condition.
Off	None	None	Port is not enabled.

T1 Port LED

The T1 port LED indicator displays loopback status only (T1 amber LED). T1 fault conditions are displayed by the T3 LED.

Table 4-2 T1 Port LED Indicator

State	Color	Alarm Class	Error Condition
Solid	Green	All okay	None.
Solid	Amber	Diagnostic mode	Port is active and in a loopback.
Solid	Red	Major/critical	T1 alarm condition(s) exist. Check the performance status or alarm status screens using the **Performance/Status Menu** to determine the cause of the condition.
Off	None	None	Port is not enabled.

System LED

The System LED displays node communication conditions. For example, the system LED can also turn red for a loss of clock condition, activating a critical alarm. Table 4-3 provides a description of the System LED states:

Table 4-3 System LED Indicator

State	Color	Alarm Class	Error Condition
Solid	Green	None	M1-3 module is okay.
Solid	Red	Critical	System failure—Check the performance status or alarm status screens.
Off	None	None	M1-3 module has no power.

M1-3 Alarms

The SCM polls the various modules for alarms. If alarm reporting is enabled for the node and for the M1-3, the SCM retrieves and sends the alarm to the Craft interface, Node Manager, or an SNMP agent.

Alarms can be automatically sent to a specified printer by setting up the printer address in the SCM management utilities menus.

Alarm Indications

The alarm list displays the following:

- Whenever the system powers up and any module performs a self-test
- Power supply input is lost
- A default or user-designated threshold is exceeded
- A Yellow Alarm is received from the network (DS1)
- An unframed all-ones or alarm indication signal (AIS) is received from the network (DS1)
- There is a loss of signal (LOS) or loss of frame (LOF) (DS1/DS3)
- A loopback is present
- A module fails
- A module is removed from the shelf

Alarm Information

The SCM alarm listing displays the following information about the alarms. Figure 4-2 shows an example of an M1-3 alarm report.

Status Code

The Status Code column displays a decimal code on an ASCII terminal.

Figure 4-2 M1-3 Display Alarm Buffer

```
A [0.0.0.2] [1,6] M1-3 > o
* 0.0.0.2          M1-3         [01,06] Minor alarm          M13 T1 Ch 255
   (1/4 hour)DS3 LOFS alert reach the threshold               8-26-98   4:23:06

* 0.0.0.2          M1-3         [01,06] Minor alarm          M13 T1 Ch 255
   (1/4 hour)DS3 LOFS alert reach3 the threshold              8-26-98   4:08:06

-- MORE -- ('q' to quit)
```

Alarm Description

The Alarm Description column lists the text that is:

- Printed on the display
- Sent to the alarm printer
- Saved to the alarm buffer/database

Classifications

Verilink classifies alarms into the following severities:

- Critical
- Major
- Minor
- Warning
- Info
- Cleared

Alarm List

Some alarms clear after the user-configured timeout has expired. Other alarms require corrective action.

- Cleared alarm, no further action is required.
- If there is a loopback present unless you are intentionally testing, remove the loopback. If the loopback is from your telco, verify the loopback with the originating source.
- If there is a Loss of Frame, you can have a telco or module problem. Activate a remote line loopback to test for Loss of Frame. If there is no Loss of Frame indicated by the test, the problem is with the telco.
- For a Loss of Signal, check router cables, power, and ports.
- If you have a self test failure, reseat the module and verify power up and self test. If the M1-3 does not pass after repeated self tests, replace the module.

Alarm Records

Every alarm record that displays on your screen is “active” in the SCM alarm database until corrected. You can do the following with the alarm records:

- Deactivating alarm records is an SCM database management function. While the alarm is active, you can view it on screen using one of the management options in the Craft interface or Node Manager. When deactivated, an alarm is still in the database, but not viewable on screen. Deactivated alarms can be achieved, printed, or deleted.
- Printing an alarm record prints a copy of all active and deactivated alarms.
- Deleting an alarm record removes it from the database. Deactivate the alarm first, then delete it.

Critical Alarms

A critical alarm indicates that the node or components of the node have failed. The following alarms are classified as critical:

- Alarm Indication Signal Second (AISS)
- Loss of Frame Second (LOFS)
- Loss of Signal Second (LOSS)

Major Alarms

A major alarm indicates a condition where performance is seriously affected, for example, a T3 line failure. It prevents data from being reliably transmitted across the circuit. When a major alarm is declared, the M1-3 module sends a message to the Craft interface and Node Manager, lights the appropriate LED indicator, and trips the alarm relay.

The following M1-3 error conditions must persist for at least one second for a major alarm to be declared:

- C-bit Severely Errored Seconds (CSES)
- P-bit Severely Errored Seconds (PSES)
- Local Unavailable Second (LUAS)
- Line Severely Errored Second (LSES)

Minor Alarms

The following error conditions do not affect traffic along the T3/T1 line. They generate a minor alarm:

- C-bit Coding- Violations (CCV)
- C-bit Errored Second (CES)
- Alarm Indication Signal Second (AISS)
- Line Coding Violation (LCV)
- Line Errored Second (LES)
- Loss of Signal Second (LOSS)
- P-bit Coding Violation (PCV)

- P-bit Errored Second (PES)
- Severely Errored Framing Second (SEFS)

Performance Reporting

The M1-3 provides a **Performance/Status Menu** to monitor the performance of the M1-3. The **Performance/Status Menu** provides threshold settings and report selections based on defined values and time intervals. The reporting options are:

- 15-Minute Report
- 1-Hour Report
- 24-Hour Report

The M1-3 threshold reporting values are changeable. The M1-3 threshold default values are established in Bellcore Technical Reference, OTGR 5.1, TR-TSY-000820. Your requirements may differ. The threshold values can be set from the **Performance Threshold Menu** described in Chapter 3.

To view the M1-3 performance reports, type "R" from the M1-3 **Performance/Status Menu** and press ENTER (Figure 4-3, and Table 4-4).

Figure 4-3 M1-3 Performance Status and Report Menus

```
-- M1-3 PERFORMANCE/STATUS MENU --

T) threshold setting          R) report selection
X) exit this menu


A [0.0.0.2] [1,6] M1-3 > r

-- M1-3 PERFORMANCE REPORT MENU --

M) 15 minute report           O) one hour report
H) 24 hour report             R) reset registers
X) exit this menu


A [0.0.0.2] [1,6] M1-3 >
```

Figure 4-4 M1-3 15-Minute Performance Report

```
-- M1-3 15 MINUTE PERFORMANCE DATA --

Site Name: SCM Tutorial          Shelf:  1  Slot:  6

Register        Count          Register        Count

FE_CCV :            0          NE_PSES :           0
FE_CES :            0          NE_CCV :            0
FE_CSES :           0          NE_CES :            0
FE_LUAS :           0          NE_CSES :           0
NE_LCV :            0          NE_SEFS :           0
NE_LES :            0          NE_AISS :           0
NE_LSES :           0          NE_LUAS :           0
NE_PCV :            0          NE_LOSS :           0
NE_PES :            0          NE_LOFS :         143

Press Enter to continue
```

Figure 4-4 shows the results of selecting a 15-minute time event within the **Performance Report Options Menu**. This menu displays the number of times within predesignated time constraints (15-minute, 1-hour, or 24-hour period) that an alarm/error event reaches the values set within the **Performance Threshold Settings Menu**. Table 4-4 defines the register report (error code) acronyms.

Table 4-4 M1-3 Performance Report Definitions

Condition	Description	Alarm Classification
FE_CCV	Far End C-bit Coding Violations error event. Displays the far-end count of C-bit parity errors occurring during the designated time interval.	Minor
FE_CES	Far End C-bit Errored Seconds. Displays a far-end second with one or more CCVs, or one or more out-of-frame errors or incoming AISs.	Minor
FE_CSES	Far End C-bit Severely Errored Seconds. Displays a far-end second with 44 or more CCVs or one or more out-of-frame errors or incoming AISs.	Major
FE_LUAS	Far End Local Unavailable Second. Displays a far-end unavailable second during which the DS3 port is unable to receive or transmit traffic.	Major
NE_AISS	Near End Alarm Indication Signal. A second during which the unit receives an all-ones (AIS) code from the network.	Major
NE_CCV	Near End C-bit Coding Violation. Displays the near-end count of C-bit parity errors occurring during the designated time interval.	Minor
NE_CES	Near End C-bit Errored Seconds.Displays a near-end second with one or more CCVs, or one or more out-of-frame errors or incoming AISs.	Minor
NE_CSES	Near End C-bit Severely Errored Seconds. Displays a near-end second with 44 or more CCVs or one or more out-of-frame errors or incoming AISs.	Major
NE_LCV	Near End Line Coding Violation. Displays a near-end bipolar violation event or an excessive zeroes event.	Minor

Condition	Description	Alarm Classification
NE_LES	Near End Line Errored Seconds. Displays a second in which one or more coding violations, or one or more loss-of-signal errors occurred.	Minor
NE_LOFS	Near End Loss of Frame. The total number of seconds the unit was in a loss-of-frame state.	Major
NE_LOSS	Near End Loss of Signal Second. The number of seconds in which the unit is in a loss of signal state.	Major
NE_LSES	Near End Line Severely Errored Seconds. A second during which the NE was (at any point during the second) in the AIS (Alarm Indication Signal) state.	Major
NE_LUAS	Near End Local Unavailable Second. Displays a near-end unavailable second during which the DS3 port is unable to receive or transmit traffic.	Major
NE_PCV	Near End P-bit Coding Violation. Displays the occurrence of a received P-bit code on the DS3 M-frame, not identical to the corresponding near-end code.	Minor
NE_PES	Near End P-bit Errored Seconds. Displays a second with one or more PCVs, or one or more out of frame errors or incoming AISs.	Minor
NE_PSES	Near End P-bit Severely Errored Seconds. Displays a second with 44 or more PCVs, or one or more out of frame errors or incoming AISs.	Major
NE_SEFS	Near End Severely Errored Framing Seconds. Displays a near-end second with one or more out-of-frame defects or incoming AISs.	Major
X	Exit this menu.	

Chapter 5

M1-3 Diagnostics

The **M1-3 Diagnostics Menu** is designed to aid in troubleshooting the M1-3 module through the use of status reporting, alarm indications, and loopbacks.

Diagnostics Menu

The M1-3 **Diagnostics Menu** supports the following options:

- Loopback Status reporting
- Alarm transmission tests
- Loopback configuration tests

To display the **Diagnostics Menu** from the **Main Menu**, type "D" and press ENTER (Figure 5-1).

Figure 5-1 M1-3 Diagnostics Menu

```
-- M1-3 DIAGNOSTICS MENU --

P) loopback status report
L) loopback selection          T) transmit alarms
X) exit this menu
```

Table 5-1 defines the **Diagnostics Menu** selections.

Table 5-1 M1-3 Diagnostics Menu

Command	Description
P	Status Report—Displays active loopback and alarm status.
L	Loopback configure—Displays the M1-3 **Loopback Options Menu**.
T	Transmit alarms—Displays the M1-3 **Transmit Alarms Menu**.
X	Exit this menu.

Loopback Status Report Menu

The **M1-3 Loopback Status Report** option displays a status report (Figure 5-2) providing alarm status (the current state of the M1-3 transmit alarms feature), and loopback configuration data.

Figure 5-2 M1-3 Status Report

```
-- M13 STATUS REPORT --

-----------------  NEAR END LOOPBACK ----------------------

T1 line loopback status :

  1   2   3   4   5   6   7   8   9  10  11  12  13  14
off off off off off off off off off off off off off off

 15  16  17  18  19  20  21  22  23  24  25  26  27  28
off off off off off off off off off off off off off off

Press Enter to continue

DS3 local loopback              DS3 line loopback
status: off                     off

                                Status
                                ------

AIS                             off
IDLE                            off
Yellow Alarm                    off
OOF                             off
LOS                             off
```

Select the **Status Report** option, and the M1-3 displays the on/off loopback status for all available loopbacks. The last page of the report displays alarm status.

NOTE: Figure 5-2 *has been edited to limit the size of the actual display.*

T1 Diagnostics

The M1-3 provides a series of menus using a direct connection to the M1-3 LOCAL port. Verilink recommends limiting the use of these menus to the **Performance Menu** only for troubleshooting the 28 T1 circuits across the MLS midplane.

CAUTION

Any changes made to M1-3 configuration using the M1-3 Local port interface will not be recognized by the SCM. Improper system operation and loss of data can result.

To access the M1-3 Craft interface menus and monitor T1 performance, connect the terminal cable to the LOCAL port on the front of the M1-3. Set your terminal parameters to:

- 19.2 kbit/s
- 8 data bits
- No parity
- One stop bit
- No flow control

1. Press ENTER and the **[2113] HSM >** prompt displays.
2. Type “craft” (lowercase).
   When the **Your Password** prompt displays,
3. Type the word “verilink” and press ENTER.

The **M1-3 Craft Interface Menu** displays as shown in Figure 5-3.

Figure 5-3 M1-3 Local Port Menu

```
  -- VERILINK M1-3 CRAFT INTERFACE at [3,2]:FW Rev 5.06, Aug 10 1998 --

Near End Location ID      :
Far  End Location ID      :
Node Address              : 0.0.0.2
Acp Backplane Bus         : A
Inband over FDL           : Enabled

      --- MAIN MENU ---

P)    Performance
D)    Diagnostics
C)    System Configuration
O)    Node Administration
W)    Change Craft Password
T)    Change Craft Timeout Length
X)    System Log Off

[2113] HSM >
```

The M1-3 LOCAL port **Performance Menu** provides a number of monitoring options. Access the **Performance Menu**, type “p” and press ENTER. The **DS3 Performance Monitoring Menu** shown in Figure 5-4 displays.

Figure 5-4 M1-3 Local Port Performance Menu

```
      --- DS3 PERFORMANCE MONITORING ---

L )   DS3 NE Performance Monitoring
F )   Local FE Performance Monitoring
Tn)   T1 NE Performance Status Display (n = 1..28)
C )   24 Hr. Alerts Crossing Threshold (NE)
Q )   Qtr. Hr. Alerts Crossing Threshold (NE)
A )   24 Hr. Alerts Crossing Threshold (Local FE)
B )   Qtr. Hr. Alerts Crossing Threshold (Local FE)
R )   Reset NE Performance Counters
S )   Reset Local FE Performance Counters
X )   exit menu

[2113] HSM >
```

To view T1 performance for any of the 28 T1's, type "t" and the line number, for example t2. The T1 performance for line 2 displays as shown in Figure 5-5.

Figure 5-5 M1-3 Local Port Performance Menu

```
     --- T1 Performance Status ---

                PORT  2

T1 LOS  Alarm  : No
T1 LOF  Alarm  : No
T1 AIS  Alarm  : No
T1 RAI  Alarm  : No

Press any key to return
```

NOTE: *When you are finished monitoring the T1 performance, return to the* ***SCM Main Menu*** *to access the M1-3 for any other options.*

M1-3 Loopbacks

M1-3 loopbacks are used to determine which segment of the network is producing an alarm condition. Loopbacks can be initiated at the near end or far end of a point-to-point connection. The M1-3 loopbacks are applicable to the T3 port and the 28 T1s which enter the M1-3 across the MLS midplane.

Loopback Configure Menu

Access the **Loopback Configure Menu** from the **Diagnostics Menu** by typing **L** and pressing ENTER. The **Loopback Line Type Selection Menu** displays. Use this menu to configure the DS3 and T1 loopbacks used by the M1-3 (Figure 5-6).

Figure 5-6 M1-3 Loopback Selection Menu

```
-- M1-3 LOOPBACK SELECTION MENU --

                Active loop:  None

D) DS3 loopbacks              T) T1 line loopback
F) T1 far end                 L) T1 local loopback
X) exit this menu
```

DS3 Loopbacks

The M1-3 supports the DS3 loopback options in Figure 5-7.

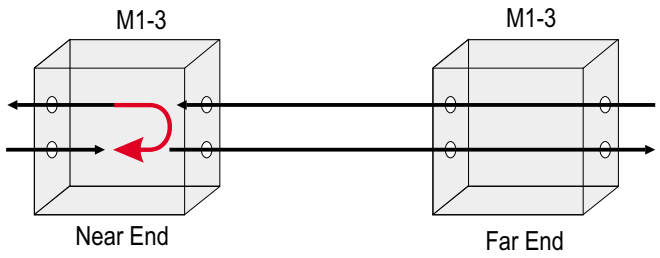
Figure 5-7 M1-3 DS3 Loopback Options Menu

```
A [0.0.0.2] [1,6] M1-3 > a
enter loopback type:
  1) local loopback
  2) line loopback
  3) FEAC far end loopback
  4) inband far end loopback
```

DS3 Local Loopback

When a DS3 local loopback is activated, the end user's T1 equipment and/or DTE is looped on itself through the M1-3 circuits at the DS3 port. The local loopback can be used to check the circuit path from the equipment through the module and back. The M1-3 also passes the equipment signal to the network. All other loopbacks in progress are deactivated during a local loopback (Figure 5-8).

Figure 5-8 DS3 Local Loopback



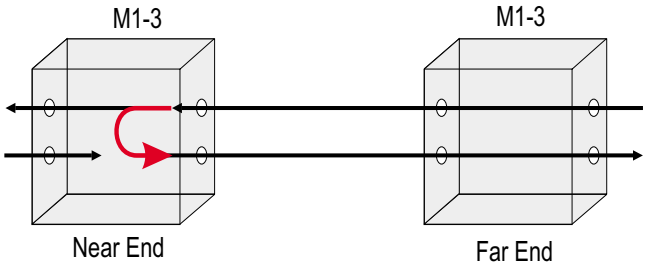
DS3 Line Loopback

When a DS3 line loopback is activated, the data received from the network is transmitted back toward the network. The looped signal passes through the M1-3 repeater so that the line loopback can be used to test the circuit from the far-end M1-3 or telephone company (Figure 5-9).

The M1-3 sends the network signal or AIS to the equipment, depending on how the M1-3 is configured.

If network loopbacks are enabled, the line loopback can also be activated by sending the industry-standard inband loop-up code (00001) for at least 5 seconds to an M1-3. It is then deactivated by sending the corresponding loop-down code (001) for the same time period.

Figure 5-9 DS3 Line Loopback



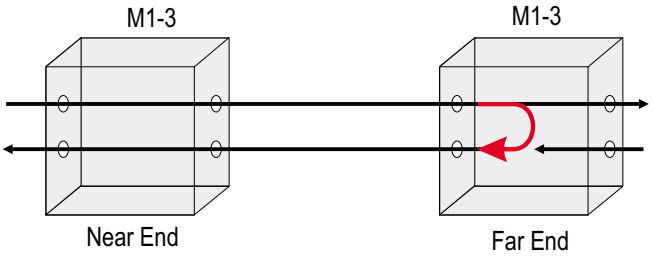
DS3 FEAC Far-End Loopback

The FEAC loopback is only applicable when in the C-bit mode. This option is disabled when operating in M1-3 mode. When a DS3 far-end line loopback is activated, the data received from the network is transmitted back toward the network. The looped signal passes through the M1-3 repeater so that the line loopback can be used to test the circuit from the near-end M1-3 or telephone company (Figure 5-10).

The FEAC channel is a part of the overhead bits in a DS3 circuit with C-Bit framing. Equipment in the telco cloud can interfere with the loop-up signal.FEAC must be enabled at both ends of the circuit. See Chapter 3 “M1-3 Configuration Options”.

The M1-3 sends the network signal or AIS to the equipment, depending on how the M1-3 is configured.

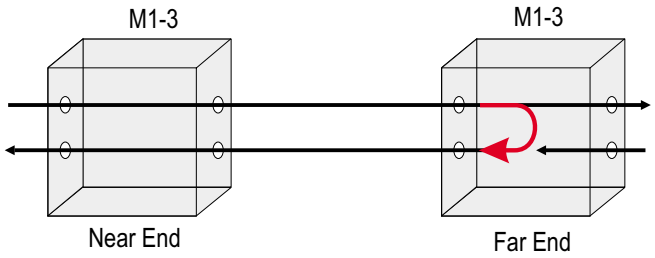
Figure 5-10 DS3 FEAC Far-End Loopback



DS3 Inband Far-End Loopback

The DS3 Inband Far-End Loopback uses the same loopback codes as the DS3 FEAC Far End Loopback. Different overhead bits are used to transmit the loopback request. This is a proprietary loop-up method which prevents equipment within the telco cloud from interfering with the loop-up codes. Both ends of the circuit must have Verilink M1-3s and have inband enabled in the **Configuration Menu**. (Figure 5-11).

Figure 5-11 DS3 Inband Far-End Loopback



M1-3 T1 Loopbacks

There are three ways to loopback the 28 T1 ports at the M1-3 midplane access point:

- Local loopback,
- Line loopback and
- Far-end loopback.

Each of these loopbacks can be activated and deactivated for individual T1s or all 28 T1s. These loopbacks are described in the following section with corresponding menu options.

T1 Loopback Types

The **M1-3 Loopback Selection Menu** (Figure 5-6) displays the T1 loopback options. Select the desired loopback type and press ENTER. The **T1 Loopback Options Menu** displays for that loopback.

For example, Figure 5-12 shows the **T1 Far End Loopback Options Menu**. The T1 loopback options for all three T1 loopbacks are the same as those in Figure 5-12.

Figure 5-12 T1 Loopback Options Menu

```
-- M1-3  T1 FAR END LINE LOOPBACK OPTIONS MENU --

                  Active loop:  None

L) list active loop status

A) activate loopback          D) deactivate loopback
W) loopback for all T1s       X) exit this menu
```

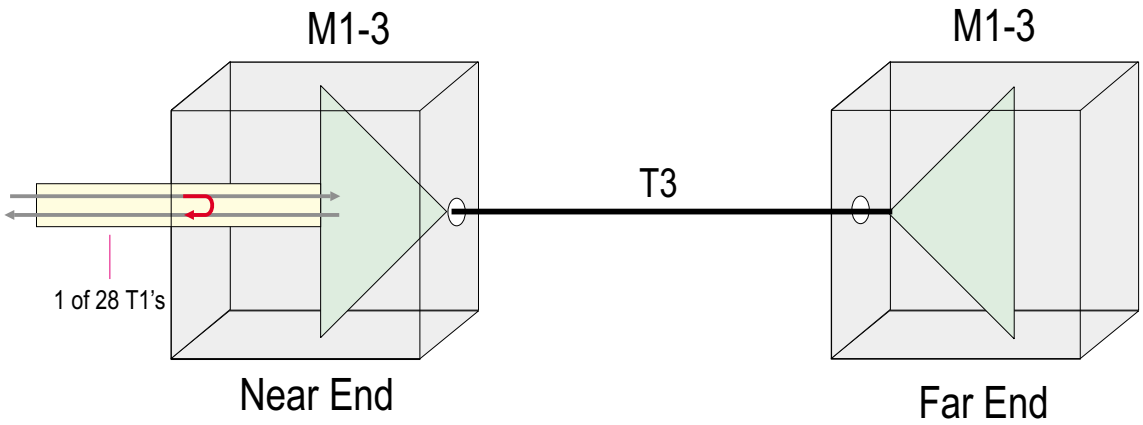
Table 5-2 T1 Far-End Line Loopback Options Menu

Command	Description
L	List Active Loop Status—Displays status of active loopbacks (Figure 5-2).
A	Activate loopback—Activates the selected T1 loopback. Type the number of the T1 to loop (1—28) or 29 to loop all T1s.
W	Loopback for All Ports—Type “1” and press ENTER to activate a T1 loopback for all 28 T1 ports. Type “2” and press ENTER to deactivate all 28 T1 loopbacks.
D	Deactivate loopback—Deactivate a T1 loopback by typing the port number (**1** to **28**) and pressing ENTER. To deactivate all T1 loopbacks from this menu type “29” and press ENTER. **Note:** When you type “29”, this does not indicate an individual loopback, it is only an option to select all T1 loopbacks.
X	Exit this menu.

T1 Local Loopback

When a local loopback is activated, the customer level 1 equipment and/or DTE signal is looped on itself before reaching the M1-3 MUX. The local loopback can be used to check the circuit path from the application equipment through the M1-3 and back (Figure 5-13).

Figure 5-13 T1 Local Loopback



T1 Line Loopback

When a line loopback is activated, the data received from the network is transmitted back toward the network. The looped signal passes through the M1-3 repeater so that the line loopback can be used to test the circuit from the far-end M1-3 or telephone company (Figure 5-16). The M1-3 automatically sends a keep alive signal (all ones) when a loopback is in progress.

To activate a line loopback for a T1, do the following:

1. From the M1-3 Loopback Selection Menu, type "T" and press ENTER then type "A" (Figure 5-14).

Figure 5-14 T1 Loopback Options Menu

```
-- M1-3  T1 LINE LOOPBACK OPTIONS MENU --

                Active loop:  None

L) list active loop status

A) activate loopback          D) deactivate loopback
W) loopback for all T1s       X) exit this menu


A [0.0.0.2] [1,6] M1-3 > a
Port 1 Enter port (1-28) or 29 (All Active)
```

2. Type the port number of the T1 to loop (1—28) or 29 to loop all T1s on the midplane and press ENTER.

The screen displays the loopback is activated (Figure 5-15).

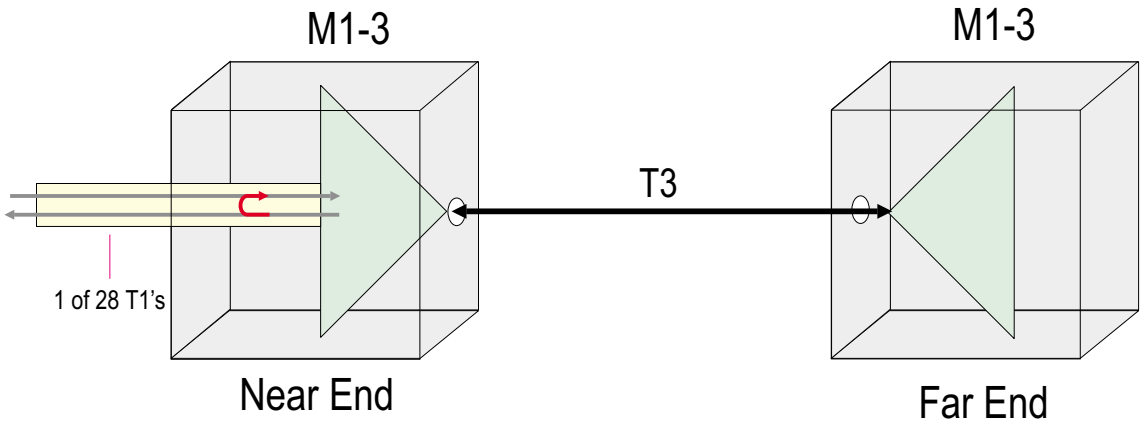
Figure 5-15 T1 Loopback Options Menu

```
-- M1-3  T1 LINE LOOPBACK OPTIONS MENU --

                Active loop:  None

L) list active loop status

A) activate loopback          D) deactivate loopback
W) loopback for all T1s       X) exit this menu


A [0.0.0.2] [1,6] M1-3 > a
Port 1 Enter port (1-28) or 29 (All Active):
7

Loopback activated
```

The line loopback can also be activated by sending the industry-standard inband loop-up code (00001) for at least 5 seconds to an M1-3. It is then deactivated by sending the corresponding loop-

down code (001) for the same time period. In ESF mode, the line loopback is also activated and deactivated by sending bit-oriented messages through the ESF Facility Data Link.

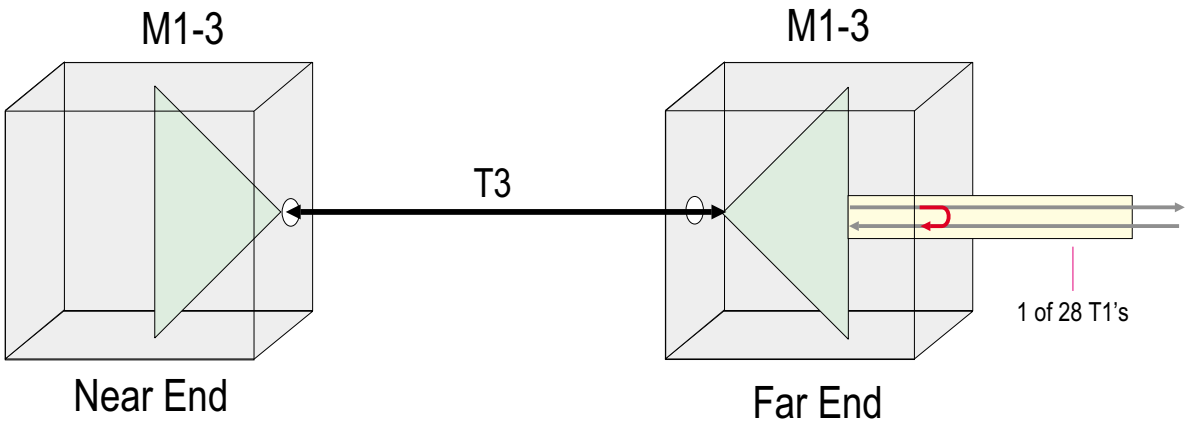
Figure 5-16 T1 Line Loopback



T1 FEAC Far End Loopback

When a T1 far-end line loopback is activated, the data received from the network is transmitted back toward the near end. The looped signal passes through the M1-3 repeater so that the line loopback can be used to test the circuit from the near-end M1-3 or telephone company (Figure 5-17).

Figure 5-17 T1 Far End Loopback



The M1-3 sends the network signal or AIS to the equipment, depending on how the M1-3 is configured.

To activate a far -end line loopback for a T1, do the following:

1. From the M1-3 Loopback Selection Menu, type "F" and press ENTER then type "A" (Figure 5-14).

Figure 5-18 T1 Loopback Options Menu

```
-- M1-3 LOOPBACK SELECTION MENU --

                Active loop:  None

D) DS3 loopbacks              T) T1 line loopback
F) T1 far end                 L) T1 local loopback
X) exit this menu


A [0.0.0.2] [1,6] M1-3 > f

-- M1-3  T1 FAR END LINE LOOPBACK OPTIONS MENU --

                Active loop:  None

L) list active loop status

A) activate loopback          D) deactivate loopback
W) loopback for all T1s       X) exit this menu

A [0.0.0.2] [1,6] M1-3 > a
```

2. Type the port number of the T1 to loop (1—28) or 29 to loop all T1s on the midplane and press ENTER.

The screen displays the loopback is activated (Figure 5-15).

T1 Loopback Options Menu

```
-- M1-3  T1 FAR END LINE LOOPBACK OPTIONS MENU --

                Active loop:  None

L) list active loop status

A) activate loopback          D) deactivate loopback
W) loopback for all T1s       X) exit this menu

A [0.0.0.2] [1,6] M1-3 > a
Port 1 Enter port (1-28) or 29 (All Active):
7

Loopback activated
```

Transmit Alarms Menu

The **M1-3 Transmit Alarm Options Menu** enables and disables the transmission of five different alarms for testing purposes. When an alarm option is enabled at the near end (a yellow alarm for example), the near-end M1-3 transmits that alarm code to the far-end M1-3. When the alarm code is received at the far end, the far-end M1-3 reports it has received that alarm in the alarm buffer.

Only one of the five alarm options should be activated at a time. Transmitting multiple alarms can cause erroneous alarm reports. For example, if a yellow alarm is indicated, the AIS, FEBE, FEAC, and Idle code cannot be generated and detected successfully. The yellow alarm sets X-bit=0, Idle code sets X-bit=1, and sends pattern 1100 on the datastream. The AIS has X-bit=1, C-bit=0, and information field of 1010. Therefore, attempting to detect multiple alarms at the same time can result in an erroneous data report.

Figure 5-19 Transmit Alarms Options Menu

```
--  M1-3 TRANSMIT ALARM OPTIONS --

A) Yellow                    disabled
B) AIS                       disabled
C) Idle                      disabled
D) FEBE                      disabled
E) FEAC                      No FEAC Alarm
X) Exit this screen
```

Table 5-3 Transmit Alarm Options Menu

Command	Description
A	**Yellow**—Enables/disables yellow alarm notification which is a T1 alarm signal sent back toward the source of a failed transmission in a DS1 transmission path. Also known as remote alarm indication signal
B	**AIS**—Enables/disables Alarm Indication Signal (AIS). The AIS signal is transmitted for an alarm condition.
C	**Idle**—Enables/disables the Idle signal which sends a framed all ones signal toward the network.
D	**FEBE**—Enables/disables Far End Block Error. Used to monitor bit error performance of the link.
E	**FEAC**—Enables/disables Far End Alarm and Control. FEAC is the channel used to initiate loopbacks at the far-end terminal from the near-end terminal.
X	Exit this menu.

Appendix

A

M1-3 Default Configuration

This appendix contains the default values for the M1-3. Only three menus have default settings. The remaining M1-3 menus contain blank fields. The M1-3 menus with default values are:

- Configuration Menu
- Performance Menu
- Diagnostics Menu

Configuration Menu Defaults

The **Configuration Menu** contains two options with default settings. These options are:

- T3 Port Defaults
- T1 Port Defaults

Figure A-1 and Figure A-2 show the default values for the T3 and T1 port configuration.

Figure A-1 T3 Port Defaults

```
-- M1-3 DS3 PORT CONFIGURATION MENU --

M) line type                  C bit
H) coding type                Bipolar
R) performance control        On
C) FEAC                       Enabled
I) inband control             Enabled
B) line build out             Normal Cable
```

Figure A-2 T1 Port Defaults

```
-- M1-3 T1 PORT CONFIGURATION MENU --

    Port                      1

I)  in service                yes
F)  frame format              SF
T)  trunk condition bits(A/B) 1/1
```

Performance Menu Default Values

The **Performance/Status Menu** contains the following submenus

- Threshold Settings, 15 Minute
- Threshold Settings, 24 Hour

Figure A-3 and Figure A-4 show the threshold setting defaults for the 15-minute and 24-hour threshold setting menu. The M1-3 threshold default values are established in Bellcore Technical Reference, OTGR 5.1, TR-TSY-000820. Your requirements may differ.

Figure A-3 Threshold Settings Defaults, 15-Minute Report

A) FE_CCV	382	B) FE_CES	86
C) FE_CSES	4	D) FE_LUAS	10
E) NE_LCV	387	F) NE_LES	86
G) NE_LSES	4	H) NE_PCV	382
I) NE_PES	86	J) NE_PSES	4
K) NE_CCV	382	L) NE_CES	86
M) NE_CSES	4	N) NE_SEFS	2
O) NE_AISS	2	P) NE_LUAS	10
Q) NE_LOSS	2	R) NE_LOFS	2

Figure A-4 Threshold Settings Defaults, 24-Hour Report

A) FE_CCV	3820	B) FE_CES	864
C) FE_CSES	40	D) FE_LUAS	10
E) NE_LCV	3865	F) NE_LES	864
G) NE_LSES	40	H) NE_PCV	3820
I) NE_PES	864	J) NE_PSES	40
K) NE_CCV	3820	L) NE_CES	864
M) NE_CSES	40	N) NE_SEFS	8
O) NE_AISS	8	P) NE_LUAS	10
Q) NE_LOSS	8	R) NE_LOFS	8

Diagnostics Menu

By default, there are no active loopbacks at any M1-3 port and all transmit test alarms are disabled. See Figure A-5 and Figure A-6.

Figure A-5 Line Loopback Options Submenu

```
-- HSM 2113  DS3 LINE LOOPBACK OPTIONS MENU --

                Active Loop:  None

L) List Active Loop Status
A) Activate loopback          D) Deactivate loopback

X) Exit this screen
```

Figure A-6 Transmit Alarm Options

```
-- HSM Transmit Alarm Options --

1) Yellow                     Disabled
2) AIS                        Disabled
3) Idle                       Disabled
4) FEBE                       Disabled
5) FEAC                       No FEAC Alarm
X) Exit this screen
```

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